Neousys Technology Inc.

Nuvo-3100 Series

Intel® 3rd-Gen Core™ i7/i5 Fanless in-Vehicle Controller

Nuvo-3100VTC

Nuvo-3120

User's Manual

Rev. A1.3

Published Jan 27th, 2015

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Date	Change List	Version
2014/08/08	- Specify that ignition control function of Nuvo-3120 is optional (page 10). - Remove E-mark from Nuvo-3120 certificate list (page 11).	A1.1
2014/09/24	- Change Nuvo-3100VTC bracket to damping version (page 53)	A1.2
2015/01/27	Correct spell: protective film	A1.3

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Contents

Declaimer....6
Declaration of Conformity....6
FCC....6
CE....6
Copyright and Trademarks....6
Chapter 1 Introduction....7
1.1 Overview....7
1.2 Product Specification....8
1.2.1 Specification of Nuvo-3100VTC....8
1.2.2 Specification of Nuvo-3120....9
1.2.3 Specification of Isolated DIO....11
1.3 Supported CPU List....12
Chapter 2 Getting to know your Nuvo-3100....13
2.1 Unpacking your Nuvo-3100 Series....13
2.2 Front Panel I/O Functions....14
2.2.1 Power Button....14
2.2.2 Reset Button....14
2.2.3 LED Indicators....15
2.2.4 WLAN/WWAN LED Indicators....15
2.2.5 USB 3.0 Connectors....16
2.2.6 Speaker-out and MIC-in Audio Jacks....16
2.2.7 DVI/HDMI Connectors....17
2.2.8 COM Ports (COM1 & COM2)....18
2.2.9 Hot-Swappable HDD Tray (Nuvo-3100VTC Only)....19
2.3 Back Panel I/O Functions....20
2.3.1 3-Pin Terminal Block for DC Input & Ignition Input....20
2.3.2 IGN On/Off Delay Configuration Switch (Nuvo-3100VTC Only)....21
2.3.3 DisplayPort Ports....22
2.3.4 USB 2.0 Connectors....23
2.3.5 Gigabit 802.3at PoE Ports (Nuvo-3100VTC)....23
2.3.6 Gigabit Ethernet Ports (Nuvo-3120)....24
2.3.7 Isolated DIO....25
2.4 Internal I/O Functions....26
2.4.1 DDR3 SODIMM Sockets....26
2.4.2 SATA Port for Internal HDD/SSD....27
2.4.3 SATA Port for HDD Tray (Nuvo-3100VTC Only)....28
2.4.4 Full-Size Mini-PCIe Connector (with SIM Socket)....29
2.4.5 Full-Size mSATA Connector (with SIM Socket)....30

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.4.6 Half-Size Mini-PCIe Connector 31
2.5 Mechanical Dimension.....32
2.5.1 Top View of Nuvo-3100VTC 32
2.5.2 Front View of Nuvo-3100VTC 33
2.5.3 Side View of Nuvo-3100VTC 33
2.5.4 Bottom View of Nuvo-3100VTC 34
2.5.5 Top View of Nuvo-3120.....35
2.5.6 Front View of Nuvo-3120 36
2.5.7 Side View of Nuvo-3120.....36
2.5.8 Bottom View of Nuvo-3120 37
Chapter 3 Getting Start.....38
3.1 Install DDR3 SODIMM Modules 38
3.1.1 Install DDR3 SODIMM Module to Nuvo-3100VTC.....38
3.1.2 Install DDR3 SODIMM Module to Nuvo-3120 39
3.2 Install 2.5" HDD/SSD 41
3.2.1 Install 2.5" HDD to Pet-Door of Nuvo-3100VTC.....41
3.2.2 Install 2.5" HDD to hot-swappable HDD tray of Nuvo-3100VTC 43
3.2.3 Install 2.5" HDD to Pet-Door of Nuvo-3120 44
3.3 Install Mini-PCIe Module.....46
3.3.1 Install Mini-PCIe Module to Nuvo-3100VTC.....46
3.3.2 Install Mini-PCIe Module to Nuvo-3120.....50
3.4 Mount your Nuvo-3100 Series 54
3.4.1 Mount your Nuvo-3100VTC with Dedicated Damping Brackets.....54
3.4.2 Mount your Nuvo-3120 on the Wall/Surface 55
3.4.3 Mount your Nuvo-3100 Series on the DIN Rail 57
3.5 Connect DC power to you Nuvo-3100 Series 58
3.6 Power on your Nuvo-3100 Series.....59
3.6.1 Power on Nuvo-3100 Series Using the Power Button.....59
3.6.2 Power on Nuvo-3100 Series Using External Latched Switch.....59
3.6.3 Power on Nuvo-3100 Series Using Wake-on-LAN Function 60
3.7 Ignition Power Control (Nuvo-3100VTC Only) 64
3.7.1 Principle of Ignition Power Control 64
3.7.2 Wiring Ignition Signal 65
3.7.3 Operation Modes of Ignition Power Control 67
Chapter 4 BIOS and Driver 70
4.1 BIOS Settings 70
4.1.1 COM1 & COM2 Operating Mode 70
4.1.2 SATA Controller Mode for Nuvo-3100VTC 71
4.1.3 Configure Hot-Swappable HDD Tray of Nuvo-3100VTC.....72
4.1.4 SATA Controller Mode for Nuvo-3120 73

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.1.5 Power On after Power Failure Option 74
4.1.6 W_DISABLE# for Mini-PCIe Sockets 75
4.1.7 System Operating Mode 76
4.1.8 Wake on LAN Option 77
4.1.9 Watchdog Timer for Booting 77
4.1.10 Select a Boot Device 79
4.2 Configure AMT (Nuvo-3100VTC Only) 80
4.3 Operating System Support 81
4.4 Driver Installation 82
4.4.1 Install All Drivers Using "One-Click" Driver Installation 82
4.4.2 Install Drivers Manually 83
Appendix A Using Watchdog Timer & Isolated DIO 85
Install WDT and DIO Library 86
Using WDT Function 88
WDT Function Reference 88
InitWDT 88
SetWDT 88
StartWDT 89
ResetWDT 89
StopWDT 89
Using DIO Function 90
Wiring for DIO 90
DIO Pin Definition 91
DIO Function Reference 92
InitDIO 92
DIReadLine 92
DIReadPort 92
DOWriteLine 93
DOWritePort 93
DOWriteLineChecked 94
DOWritePortChecked 94
Using COS Function 95
SetupDICOS 95
RegisterCallbackDICOS 96
StartDICOS 96
StopDICOS 97
DI COS Example 98

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Declaimer

This manual is intended to be used as a practical and informative guide only and is subject to change without prior notice. It does not represent commitment from Neousys Technology Inc. Neousys shall not be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of the product or documentation, nor for any infringements upon the rights of third parties, which may result from such use.

Declaration of Conformity

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

Copyright and Trademarks

This document contains proprietary information protected by copyright. All rights are reserved. No part of this document may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Company/product names mentioned herein are used for identification purposes only and are trademarks and/or registered trademarks of their respective companies.

Chapter 1 Introduction

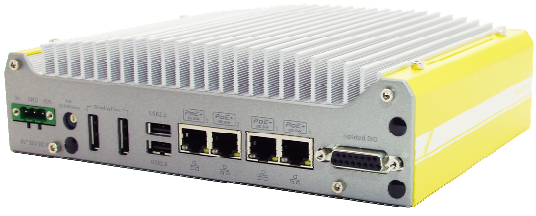
1.1 Overview

Introducing the most compact in-vehicle fanless controller supporting PGA-type 3rd-Gen i7/i5 processor!

Neousys' Nuvo-3100 series features the dimension of only 212 mm x 165 mm x 62 mm. While other compact fanless controllers adopt low-voltage, BGA-type i7 CPU (17W TDP), Nuvo-3100 supports standard voltage, PGA-type i7/i5/i3 CPU for flexible CPU installation. To solve the trade-off between heat-sink size and operating temperature, a unique feature, configurable CPU power mode, is developed for Nuvo-3100 series. According to ambient condition, users can configure the system to operate in maximal performance, reduced performance or extended temperature mode.

Plenty of I/O functions, such as Gigabit Ethernet, USB 3.0, SATA, COM ports, mini-PCIe and isolation DIO are provided in Nuvo-3100's compact chassis. Nuvo-3100 series supports 8~35V DC input to be deployed in various environments.

As the designated model for in-vehicle applications, Nuvo-3100VTC further integrates IEEE 802.3at PoE, intelligent ignition power control and a hot-swappable HDD tray. It carries E-Mark to meet the requirements of European UN regulations for in-vehicle usage.



Nuvo-3100VTC

Nuvo-3120

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

1.2 Product Specification

1.2.1 Specification of Nuvo-3100VTC

System Core	
Processor	Supports the following CPU ● Intel® Core™ i7-3610QE (2.3/3.3 GHz, 6 MB cache) ● Intel® Core™ i5-3610ME (2.7/3.3 GHz, 3 MB cache) ● Intel® Celeron™ 1020E (2.2 GHz, 2 MB cache)
Chipset	Intel® QM77 Platform Controller Hub with AMT & RAID support
Graphics	Integrated Intel® HD Graphics 4000 Controller
Memory	1x 204-pin SO-DIMM sockets, up to 8 GB DDR3 1333/1600 MHz SDRAM
I/O Interface	
Ethernet	1x Gigabit Ethernet port by Intel® 82579LM, supporting Wake-on-LAN 3x Gigabit Ethernet ports by Intel® i210
PoE	Compliant to IEEE 802.3at (25.5W) with per-port power on/off control 75W total power budget for 4x PoE ports
Video Port	1x DVI-I connector for VGA/DVI output, supporting 2048x1536 (VGA) or 1920x1080 (DVI) resolution 2x DisplayPort, supporting 2560x1600 resolution
USB	4x USB 3.0 ports and 2x USB 2.0 ports
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2)
Isolated DIO	4x isolated DI with COS interrupt and 4x isolated DO
Audio	1x mic-in and 1x speaker-out
Storage Interface	
SATA HDD	1x Internal SATA port for 2.5" HDD/SSD 1x Hot-swappable HDD tray for 2.5" HDD/SSD
mSATA	1x full-size mSATA (SATA/USB/W_DISABLE#) with USIM socket
Expansion Bus	
Mini PCI-E	1x full-size mini PCI Express socket with USIM socket 1x half-size mini PCI Express socket
Power Supply & Ignition Control	
DC Input	8~35V DC input via 3-pin pluggable terminal block
Ignition Control	Ignition power control with user-selectable on/off delay
Max. Power Consumption	With Core™ i7-3610QE: 68.8W (3.62A@19V)* With Core™ i5-3610ME: 46.9W (2.47A@19V)* With Celeron™ 1020E: 41.4W (2.18A@19V)*

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

<table>
<tr><td colspan="2">Mechanical</td></tr>
<tr><td>Dimension</td><td>212 mm (W) x 165 mm (D) x 62 mm (H)</td></tr>
<tr><td>Weight</td><td>2.8 Kg (including one 2.5" HDD and DDR3 SODIMM)</td></tr>
<tr><td>Mounting</td><td>Wall-mounting (Standard) or DIN-Rail mounting (optional)</td></tr>
<tr><td colspan="2">Environmental</td></tr>
<tr><td>Operating Temperature</td><td>
<table>
<tr><td></td><td>i7-3610QE, 100% CPU loading*</td><td>i5-3610ME, 100% CPU loading*</td><td>Celeron 1020E, 100% CPU loading*</td></tr>
<tr><td>Maximal Performance</td><td>-25°C ~ 50°C**</td><td>-25°C ~ 60°C**</td><td>-25°C ~ 70°C**</td></tr>
<tr><td>Reduced Performance</td><td>-25°C ~ 60°C**</td><td>-25°C ~ 70°C**</td><td>-25°C ~ 70°C**</td></tr>
<tr><td>Extended Temperature</td><td>-25°C ~ 70°C**</td><td>-25°C ~ 70°C**</td><td>-25°C ~ 70°C**</td></tr>
</table>
</td></tr>
<tr><td>Storage Temperature</td><td>-40°C ~85°C</td></tr>
<tr><td>Humidity</td><td>10%~90% , non-condensing</td></tr>
<tr><td>Vibration</td><td>Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)</td></tr>
<tr><td>Shock</td><td>Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)</td></tr>
<tr><td>Certification</td><td>E-Mark for vehicle applications
EN 50155 / EN 50121-3-2
CE/FCC Class A, according to EN 55022 & EN</td></tr>
</table>

** The maximal power consumption is measured in Max. Performance Mode with 100% CPU loading applied using Passmark® BurnInTest™ v7.0. For detail testing criteria, please contact Neousys Technology*

*** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.*

1.2.2 Specification of Nuvo-3120

System Core	
Processor	Supports the following CPU ● Intel® Core™ i7-3610QE (2.3/3.3 GHz, 6 MB cache) ● Intel® Core™ i5-3610ME (2.7/3.3 GHz, 3 MB cache) ● Intel® Celeron™ 1020E (2.2 GHz, 2 MB cache)
Chipset	Intel® QM76 Platform Controller Hub
Graphics	Integrated Intel® HD Graphics 4000 Controller
Memory	1x 204-pin SO-DIMM sockets, up to 8 GB DDR3 1333/1600 MHz SDRAM
I/O Interface	
Ethernet	1x Gigabit Ethernet port by Intel® 82579LM, supporting Wake-on-LAN

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

<table>
<tr><td></td><td>1x Gigabit Ethernet ports by Intel® i210</td></tr>
<tr><td>Video Port</td><td>1x DVI-I connector for VGA/DVI output, supporting 2048x1536 (VGA) or 1920x1080 (DVI) resolution
2x DisplayPort, supporting 2560x1600 resolution</td></tr>
<tr><td>USB</td><td>4x USB 3.0 ports and 2x USB 2.0 ports</td></tr>
<tr><td>Serial Port</td><td>2x software-programmable RS-232/422/485 (COM1 & COM2)</td></tr>
<tr><td>Isolated DIO</td><td>4x isolated DI with COS interrupt and 4x isolated DO</td></tr>
<tr><td>Audio</td><td>1x mic-in and 1x speaker-out</td></tr>
<tr><td colspan="2">Storage Interface</td></tr>
<tr><td>SATA HDD</td><td>1x Internal SATA port for 2.5" HDD/SSD</td></tr>
<tr><td>mSATA</td><td>1x full-size mSATA (SATA/USB/W_DISABLE#) with USIM socket</td></tr>
<tr><td colspan="2">Expansion Bus</td></tr>
<tr><td>Mini PCI-E</td><td>1x full-size mini PCI Express socket with USIM socket
1x half-size mini PCI Express socket</td></tr>
<tr><td colspan="2">Power Supply & Ignition Control</td></tr>
<tr><td>DC Input</td><td>8~35V DC input via 3-pin pluggable terminal block</td></tr>
<tr><td>Ignition Control</td><td>Ignition power control with user-selectable on/off delay (Optional)</td></tr>
<tr><td>Max. Power Consumption</td><td>With Core™ i7-3610QE: 65.6W (3.45A@19V)*
With Core™ i5-3610ME: 43.9W (2.31A@19V)*
With Celeron™ 1020E: 38.5W (2.03A@19V)*</td></tr>
<tr><td colspan="2">Mechanical</td></tr>
<tr><td>Dimension</td><td>212 mm (W) x 165 mm (D) x 62 mm (H)</td></tr>
<tr><td>Weight</td><td>2.7 Kg (including one 2.5" HDD and DDR3 SODIMM)</td></tr>
<tr><td>Mounting</td><td>Wall-mounting (Standard) or DIN-Rail mounting (optional)</td></tr>
<tr><td colspan="2">Environmental</td></tr>
<tr><td>Operating Temperature</td><td>
<table>
<tr><td></td><td>i7-3610QE, 100% CPU loading*</td><td>i5-3610ME, 100% CPU loading*</td><td>Celeron 1020E, 100% CPU loading*</td></tr>
<tr><td>Maximal Performance</td><td>-25°C ~ 50°C**</td><td>-25°C ~ 60°C**</td><td>-25°C ~ 70°C**</td></tr>
<tr><td>Reduced Performance</td><td>-25°C ~ 60°C**</td><td>-25°C ~ 70°C**</td><td>-25°C ~ 70°C**</td></tr>
<tr><td>Extended Temperature</td><td>-25°C ~ 70°C**</td><td>-25°C ~ 70°C**</td><td>-25°C ~ 70°C**</td></tr>
</table>
</td></tr>
<tr><td>Storage Temperature</td><td>-40°C ~85°C</td></tr>
<tr><td>Humidity</td><td>10%~90% , non-condensing</td></tr>
<tr><td>Vibration</td><td>Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)</td></tr>
<tr><td>Shock</td><td>Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to</td></tr>
</table>

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

	IEC60068-2-27)
Certification	CE/FCC Class A, according to EN 55022 & EN

** The maximal power consumption is measured in Max. Performance Mode with 100% CPU loading applied using Passmark® BurnInTest™ v7.0. For detail testing criteria, please contact Neousys Technology*

*** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.*

1.2.3 Specification of Isolated DIO

Isolated Digital Input	
No. of Channel	4-CH Isolated Digital Input Channels
Logic Level	Logic High: 5 to 24V Logic Low: 0 to 1.5V
Isolated Voltage	2500 Vrms
Input Resistance	2.4kΩ
Operation Mode	Polling I/O, Change-of-State Interrupt
Isolated Digital Output	
No. of Channel	4-CH Isolated Digital Output Channels
Sink Current (per channel)	100 mA (sustained loading) 250 mA (peak loading)
Isolated Voltage	2500 Vrms
Operation Mode	Polling, Change-of-State Interrupt
Output Type	Power MOSFET + Analog Device iCoupler®
Operation Mode	Polling I/O and Change-of-State interrupt for DI

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

1.3 Supported CPU List

Nuvo-3100 series accepts a PGA-type Intel® 3rd-Gen i7/i5/3 processor via the PGA988 CPU socket. In addition to i7-3610QE, i5-3610ME and Celeron 1020E, you may also select other processor listed below according to your consideration of cost and performance.

- Intel® Core™ i7-3840QM Processor (8M Cache, up to 3.80 GHz)
- Intel® Core™ i7-3820QM Processor (8M Cache, up to 3.70 GHz)
- Intel® Core™ i7-3740QM Processor (6M Cache, up to 3.70 GHz)
- Intel® Core™ i7-3720QM Processor (6M Cache, up to 3.60 GHz)
- Intel® Core™ i7-3630QM Processor (6M Cache, up to 3.40 GHz)
- **Intel® Core™ i7-3612QE Processor (6M Cache, up to 3.10 GHz) ***
- Intel® Core™ i7-3610QM Processor (6M Cache, up to 3.30 GHz)
- **Intel® Core™ i7-3610QE Processor (6M Cache, up to 3.30 GHz) ***
- Intel® Core™ i7-3540M Processor (4M Cache, up to 3.70 GHz)
- Intel® Core™ i7-3520M Processor (4M Cache, up to 3.60 GHz)
- **Intel® Core™ i5-3610ME Processor (3M Cache, up to 3.30 GHz) ***
- Intel® Core™ i5-3380M Processor (3M Cache, up to 3.60 GHz)
- Intel® Core™ i5-3360M Processor (3M Cache, up to 3.50 GHz)
- Intel® Core™ i5-3340M Processor (3M Cache, up to 3.40 GHz)
- Intel® Core™ i5-3320M Processor (3M Cache, up to 3.30 GHz)
- Intel® Core™ i5-3230M Processor (3M Cache, up to 3.20 GHz)
- Intel® Core™ i5-3210M Processor (3M Cache, up to 3.10 GHz)
- **Intel® Core™ i3-3120ME Processor (3M Cache, 2.40 GHz) ***
- Intel® Core™ i3-3120M Processor (3M Cache, 2.50 GHz)
- Intel® Core™ i3-3110M Processor (3M Cache, 2.40 GHz)
- Intel® Celeron® Processor 1020M (2M Cache, 2.10 GHz)
- **Intel® Celeron® Processor 1020E (2M Cache, 2.20 GHz) ***
- Intel® Celeron® Processor 1000M (2M Cache, 1.80 GHz)

*The processors with * are listed in Intel® Embedded Roadmap and with a 7-year life cycle support (2013~2019).*

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Chapter 2 Getting to know your Nuvo-3100

2.1 Unpacking your Nuvo-3100 Series

When you receive the package of Nuvo-3100 series, please check immediately if the package contains all the items listed in the following table. If any item is missing or damaged, please contact your local dealer or Neousys Technology for further assistance.

Nuvo-3100VTC

Item	Description	Qty
1	Nuvo-3100VTC fanless in-vehicle controller (According to the configuration you order, CPU/DDR3/HDD may be included. Please verify these items if necessary.)	1
2	Accessory box, which contains	
	● Neousys Drivers & Utilities DVD	1
	● Damping bracket for in-vehicle deployment	2
	● Shock-absorbing grommet	8
	● DVI-to-VGA adapter	1
	● 3-pin pluggable terminal block	1
	● Key for hot-swappable HDD tray	1
	● HDD thermal pad for 2.5" HDD/SSD (if HDD is not installed)	1
	● Screw pack	1

Nuvo-3120

Item	Description	Qty
1	Nuvo-3120 fanless in-vehicle controller (According to the configuration you order, CPU/DDR3/HDD may be included. Please verify these items if necessary.)	1
2	Accessory box, which contains	
	● Neousys Drivers & Utilities DVD	1
	● Wall-mounting bracket	2
	● DVI-to-VGA adapter	1
	● 3-pin pluggable terminal block	1
	● HDD thermal pad for 2.5" HDD/SSD (if HDD is not installed)	1
	● Screw pack	1

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.2 Front Panel I/O Functions

On Nuvo-3100 series, plenty of I/O functions are provides on front panel and back panel so you can easily access them. Most common computer I/O functions are placed on the front panel. In this section, we'll illustrate each I/O function on the front panel.

2.2.1 Power Button

The power button is a non-latched switch for ATX mode on/off operation. To turn on the Nuvo-3100VTC/3120, press the power button and the PWR LED is lighted up. To turn off the Nuvo-3100VTC/3120, you can either issue a shutdown command in OS, or just simply press the power button. In case of system halts, you can press and hold the power button for 5 seconds to compulsorily shut down the system. Please note that a 5 seconds interval is kept by the system between two on/off operations (i.e. once turning off the system, you shall wait for 5 seconds to initiate another power-on operation).

2.2.2 Reset Button

The reset button is used to manually reset the system in case of any abnormal condition. To avoid unexpected operation, the reset button is hidden behind the front panel. You need to use a pin-like object to push the reset button.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.2.3 LED Indicators

There are four LED indicators on the front panel: PWR, HDD, WDT and IGN. The descriptions of these four LEDs are listed in the following table.

Indicator	Color	Description
PWR	Green	Power indictor, lighted-up when system is on.
HDD	Red	Hard drive indicator, flashing when SATA HDD is active..
WDT	Yellow	Watchdog timer indicator, flashing when watchdog timer is started.
IGN	Green	Ignition signal indicator, lighted-up when IGN is high (12V/24V).

2.2.4 WLAN/WWAN LED Indicators

There are another three LED indicators on the front panel to present status of wireless communication. Per the specification of mini-PCIe, signals of LED_WLAN# and LED_WWAN# can be used by WIFI/3G module to indicate its communication status. These LEDs are connected to three mini-PCIe/mSATA (with SIM) slots respectively. Once LED_WLAN# or LED_WWAN# is de-asserted, the LED is lighted

Indicator	Color	Description
Left	Green	WLAN/WWAN LED Indicator for full-size mini-PCIe slot with SIM
Mid	Green	WLAN/WWAN LED Indicator for full-size mSATA slot with SIM
Right	Green	WLAN/WWAN LED Indicator for half-size mini-PCIe slot

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.2.5 USB 3.0 Connectors

Nuvo-3100 series offers four USB 3.0 (SuperSpeed USB) ports on its front panel. By BIOS default, these USB ports are operated in xHCI (eXtensible Host Controller Interface) mode and are compatible with USB 3.0, USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB support is also provided so you can use USB keyboard/mouse in DOS environment. To use USB 3.0 ports in Windows environment, you need to install corresponding USB 3.0 driver. Please refer to section 4.4 for information of driver installation.

Note

1. *Intel USB 3.0 driver does not support Windows XP. In Windows XP, all USB 3.0 ports will work in USB 2.0 mode.*

2.2.6 Speaker-out and MIC-in Audio Jacks

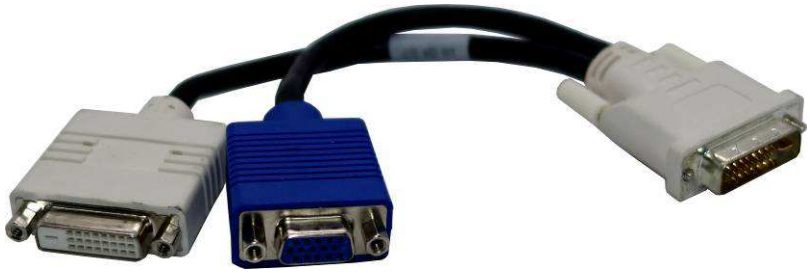
Nuvo-3100 series provides audio function using Intel® High Definition Audio (built-in in QM77/HM76 PCH) and Realtek ALC262 codec. There are two audio jacks on the front panel. The left one is used for microphone input, and the right one is used for speaker output. To utilize the audio function in Windows, you need to install corresponding drivers for both Intel® HM76 PCH chipset and Realtek ALC262 codec. Please refer to section 4.4 for information of driver installation.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.2.7 DVI/HDMI Connectors

Nuvo-3100 series supports triple independent display outputs via a DVI-I/HDMI connector (front panel) and two DisplayPort connectors (back panel). The DVI-I connector on the front panel offers DVI/HDMI and VGA display outputs. The DVI/HDMI output can be either DVI signals or HDMI signal depending on the display device connected and support up to 1920 x 1080 resolution. The VGA output supports up to 2048x1536 resolution.
For VGA monitor, Neousys offers a dedicated DVI-to-VGA adapter as an accessory shipped with Nuvo-3100 series. This adapter supports VGA DDC signals and thus eliminates compatibility issues with VGA monitors. Or you can use a DVI-I to VGA+DVI-D Y-cable to support two independent display outputs.

DVI-to-VGA Adapter



DVI-I to VGA+DVI-D Y-Cable

Due to the limitation of Intel® QM77/HM76 PCH, the feature of triple independent display outputs is only available via the configuration of DVI+DisplayPort+DisplayPort or VGA+DisplayPort+DisplayPort. You also need to install corresponding graphics driver for Windows XP/7/8 to enable this feature. Please refer to section 4.4 for information regarding driver installation.

Note

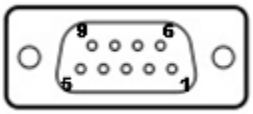
If you want to connect to a VGA monitor via DVI-I connector, please use the DVI-to-VGA adapter shipped with Nuvo-3100 series. Some off-the-shelf DVI-to-VGA adapters may have incompatible pin definition and cause compatibility issue with DVI-I output of Nuvo-3100 series.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.2.8 COM Ports (COM1 & COM2)

Nuvo-3100 series provides two COM ports via two 9-pin D-Sub male connectors on the front panel for communicating with external devices. They are implemented using industrial-grade ITE8783 Super IO chip (-40 to 85°C) and provide up to 115200 bps baud rate.

Both COM1 and COM2 support software-selectable RS-232/422/485 mode. The operation mode of COM1/COM2 can be set in BIOS setup utility (refer to section 4.1.1 for detail). The following table describes the pin definition of COM ports.



Pin#	RS-232 Mode	RS-422 Mode	RS-485 Mode (Two-wire 485)
1	DCD		
2	RX	422 TXD+	485 TXD+/RXD+
3	TX	422 RXD+	
4	DTR	422 RXD-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS	422 TXD-	485 TXD-/RXD-
9	RI		

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.2.9 Hot-Swappable HDD Tray (Nuvo-3100VTC Only)

Nuvo-3100VTC supports the second 2.5" HDD in the accommodation of a hot-swappable HDD tray. This HDD tray comes with a locking mechanism to secure the HDD installed. Please refer to section 3.2.2 for information regarding installing a HDD to the hot-swappable HDD tray.

This HDD tray supports hot-swap operation for storage portability, as well as fixed mode for OS installation or RAID 0/1 operation with the first HDD. You can configure the operation mode of this SATA port in BIOS. Please refer to section 4.1.2/4.1.3 for further information.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.3 Back Panel I/O Functions

To fit more general application requirements, Nuvo-3100 series offers more I/O functions on its back panel. In this section, we'll illustrate each I/O function on the back panel.

2.3.1 3-Pin Terminal Block for DC Input & Ignition Input

Nuvo-3100 series allows a wide range of DC power input from 8 to 35V via a 3-pin pluggable terminal block. It is fit for field usage where DC power is usually provided and its screw clamping connection of terminal block gives a very reliable way of wiring the DC power. For detail information of supplying DC power via pluggable terminal block, please refer to section 3.5.

In addition to DC power input, this terminal block is also used for ignition signal input for in-vehicle applications. For detail information of ignition power control, please refer to section 3.7.

Pin	Description	Example when deployed in vehicle
V+	Positive polarity of DC power input.	Connected to car battery (12V/24V)
GND	Ground of DC power input.	Connected battery GND
IGN	Ignition signal input.	Connected to ACC power of vehicle

Caution

1. *Please make sure the voltage of DC power is correct before you connect it to Nuvo-3100VTC/3120. Supplying a voltage over 35V will damage the system.*
2. *The IGN input accepts ACC power of car (12VDC) or bus/truck (24VDC). Supply a voltage over 35V to IGN input to will damage the system.*

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.3.2 IGN On/Off Delay Configuration Switch (Nuvo-3100VTC Only)

Nuvo-3100VTC features intelligent ignition power control with user-configurable power on/off delay. The IGN on/off delay configuration switch on the back panel allows users to adjust duration of power-on delay and power-off delay per application's requirement. A total of 8 modes are available for Rev. A1 (S/N from E2500000 to E2500100) and a total of 16 modes are available for Rev. A2. Please refer to section 3.7 for more information regarding ignition power control.

IGN On/Off Delay Configuration for Nuvo-3100VTC Rev. A1

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
0	ATX mode		
1	AT mode (power on after power supplied)		
2	10 seconds	10 seconds	10 minutes
3	30 seconds	1 minute	10 minutes
4	30 seconds	5 minutes	10 minutes
5	30 seconds	30 minutes	10 minutes
6	30 seconds	2 hours	10 minutes
7	30 seconds	5 hours	10 minutes

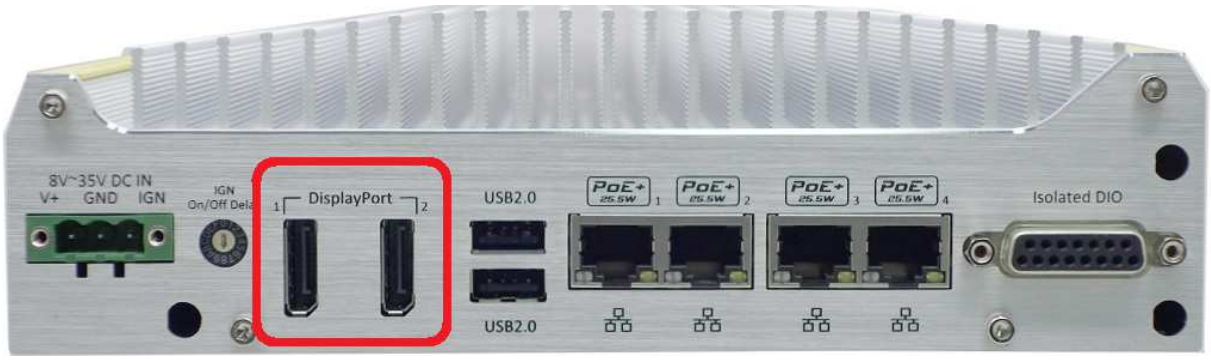
IGN On/Off Delay Configuration for Nuvo-3100VTC Rev. A2

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
0	ATX mode		
1	AT mode (power on after power supplied)		
2	Remote On/Off control mode **(available for both Nuvo-3100VTC & Nuvo-3120)**		
3	10 seconds	10 seconds	10 minutes
4	10 seconds	1 minute	10 minutes

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

5	10 seconds	5 minutes	10 minutes
6	30 seconds	1 minute	10 minutes
7	30 seconds	5 minutes	10 minutes
8	30 seconds	10 minutes	10 minutes
9	3 minutes	1 minute	10 minutes
A	3 minutes	10 minutes	10 minutes
B	3 minutes	30 minutes	10 minutes
C	10 minutes	30 minutes	10 minutes
D	30 seconds	2 hours	10 minutes
E	3 minutes	2 hours	10 minutes
F	30 seconds	5 hours	10 minutes

2.3.3 DisplayPort Ports

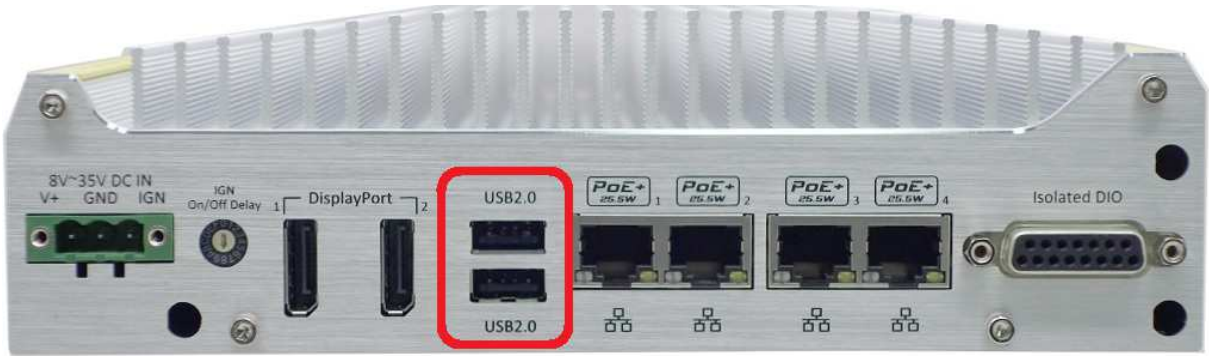


Nuvo-3100 series supports triple independent display outputs via a DVI-I/HDMI connector (front panel) and two DisplayPort connectors (back panel). The DisplayPort connectors on the back panel support up to 2560 x 1600 resolution.

Due to the limitation of Intel® QM77/HM76 PCH, the feature of triple independent display outputs is only available via the configuration of DVI+DisplayPort+DisplayPort or VGA+DisplayPort+DisplayPort. You also need to install corresponding graphics driver for Windows XP/7/8 to enable this feature. Please refer to section 4.4 for information regarding driver installation.

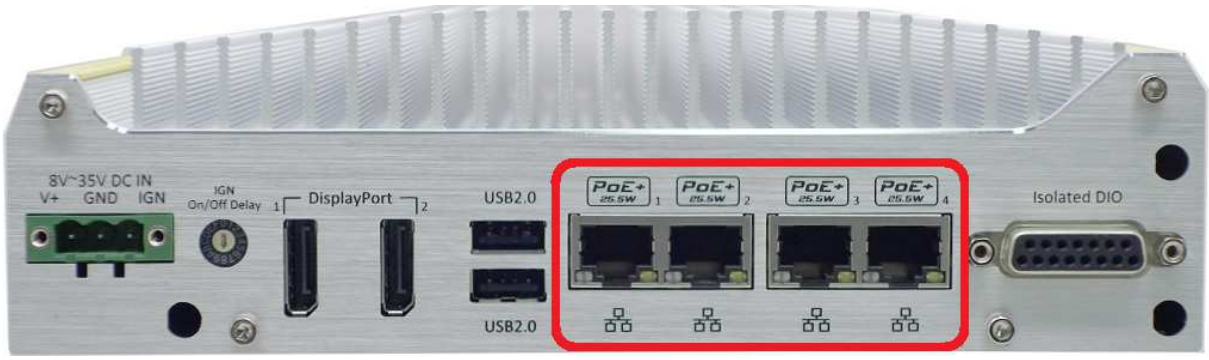
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.3.4 USB 2.0 Connectors



In addition to four USB 3.0 ports, Nuvo-3100 series provides another two USB 2.0 ports on the back panel. By BIOS default, these USB 2.0 ports are operated in EHCI (Enhanced Host Control Interface) mode and are compatible with USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB support is provided so you can use USB keyboard/mouse in DOS environment.

2.3.5 Gigabit 802.3at PoE Ports (Nuvo-3100VTC)



PoE, or Power over Ethernet, is a technology to supply electrical power along with data on a standard CAT-5/CAT-6 Ethernet cable. Nuvo-3100VTC, acting as a PoE PSE (Power Sourcing Equipment), integrates four GigE PoE ports compliant with IEEE 802.3at standard. Each PoE port can deliver 25.5 W of power to a PoE PD (Powered Device), such as a PoE IP camera. PoE defines a mechanism to automatically detect the device connected and determine whether to dispatch power. This makes PoE port 100% compatible with traditional Ethernet devices.

Four GigE PoE ports are located on the back panel. The first PoE port is implemented using Intel® 82579LM and the rest three PoE ports are implemented using Intel® I210 Gigabit Ethernet controllers. Each port has one dedicated GigE controller and one dedicated PCI Express link to present maximal network performance. When plugging in the Ethernet cable, you can tell the Ethernet status and speed from the LED indicators on the RJ45 connector as following:

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Active/Link LED

LED Color	Status	Description
Yellow	Off	Ethernet port is disconnected
	On	Ethernet port is connected and no data transmission
	Flashing	Ethernet port is connected and data is transmitting/receiving

Speed LED

LED Color	Status	Description
Green or Orange	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

The first GigE PoE port, which is implemented using Intel® 82579LM, supports Wake-on-LAN function. It is also capable of operating with Intel® AMT (Active Management Technology) to support advanced features such remote SOL desktop and remote on/off control. Please refer to section 4.2 for information of configuring AMT, and section 4.4 for information of driver installation for Windows XP/7/8.

2.3.6 Gigabit Ethernet Ports (Nuvo-3120)

Nuvo-3120 controller offers two Gigabit Ethernet ports located on the back panel. The first GbE port is implemented by Intel® 82579LM and the second GbE port is implemented using Intel® I210 Gigabit Ethernet controllers. Each port has one dedicated PCI Express link to present maximal network performance. When plugging in the Ethernet cable, you can tell the Ethernet status and speed from the LED indicators on the RJ45 connector as following:

Active/Link LED

LED Color	Status	Description
Yellow	Off	Ethernet port is disconnected
	On	Ethernet port is connected and no data transmission
	Flashing	Ethernet port is connected and data is transmitting/receiving

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

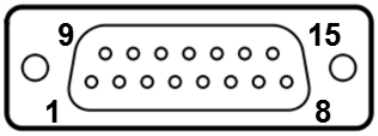
Speed LED

LED Color	Status	Description
Green or Orange	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

The first GigE PoE port, which is implemented using Intel® 82579LM, supports Wake-on-LAN function. Please refer to section 3.6.3 for information of using Wake-on-LAN, and section 4.4 for information of driver installation for Windows XP/7/8.

2.3.7 Isolated DIO

Nuvo-3100 series provides 4x isolated digital input channels and 4x isolated digital output channels. DIO function on Nuvo-3100 series supports polling mode I/O access and DI Change-of-State interrupt. Please refer to **Appendix A Using Watchdog Timer & Isolated DIO** for information about wiring and programming the isolated DIO channels.



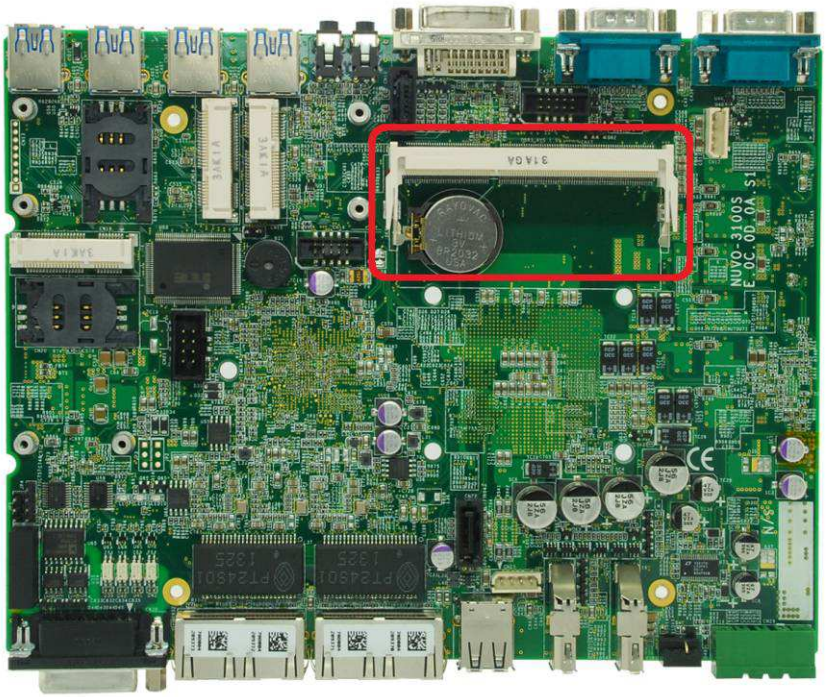
Pin#	Pin Definition	Pin#	Pin Definition
1	DI_0	9	DI_GND
2	DI_1	10	DI_2
3	DI_GND	11	DI_3
4	DO_GND	12	DO_GND
5	DO_0	13	DO_2
6	DO_1	14	DO_3
7	DO_GND	15	ISO_5V
8	VDD		

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.4 Internal I/O Functions

In addition to I/O connectors on the front/back panel, Nuvo-3100 series provides other useful features via its on-board connectors, such as SATA ports, mini-PCIe sockets, internal USB ports, optional COM ports and etc. In this section, we'll illustrate these internal I/O functions.

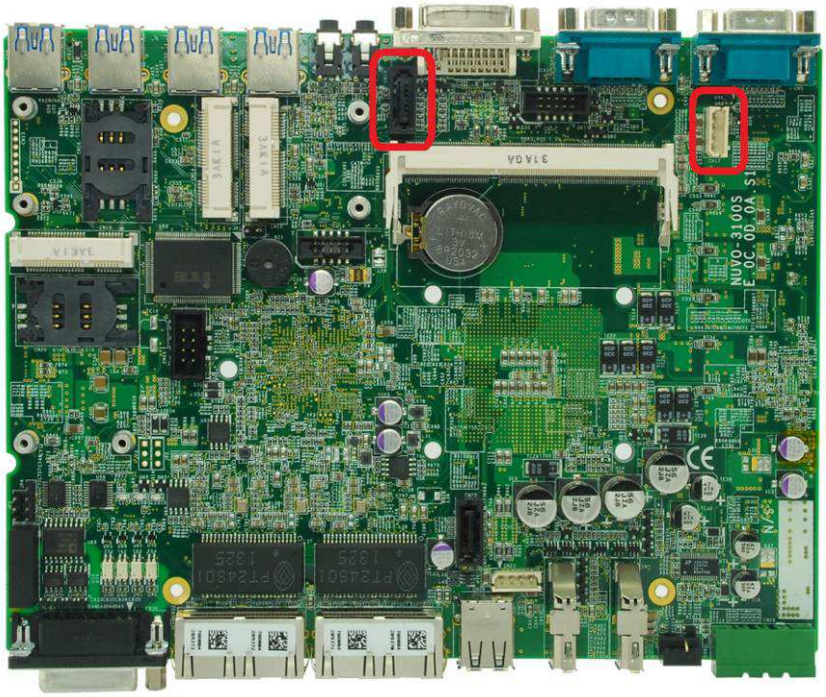
2.4.1 DDR3 SODIMM Sockets



Nuvo-3100 series provides a 204-pin, SODIMM socket for installing DDR3 memory module. It supports up to 8GB DDR3 1600MHz SODIMM module. For information of installing DDR3 memory modules, please refer to section 3.1 for detail.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

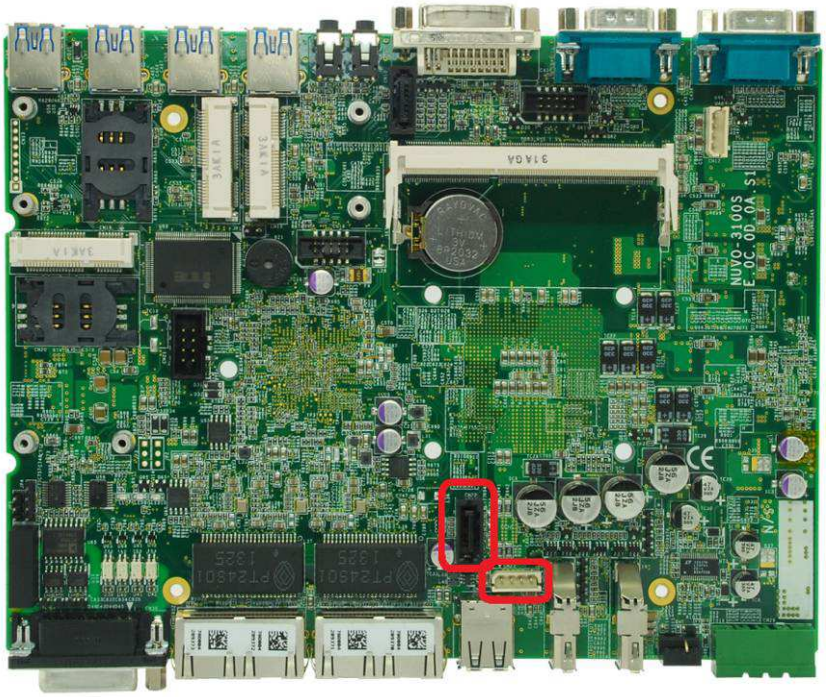
2.4.2 SATA Port for Internal HDD/SSD



Nuvo-3100 series provides internal SATA ports to accommodate SATA hard drives. Each SATA port is composed of a 7-pin SATA connector and a 4-pin power connector. SATA#1 Port is used in conjunction with the HDD bracket on "Pet-Door" to accommodate a 2.5" HDD/SSD. A dedicated cable is assembled inside Nuvo-3100VTC/3120 to connect SATA#1 port and HDD/SSD. For information of installing a HDD/SSD to SATA#1 port, please refer to section 3.2 for detail.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

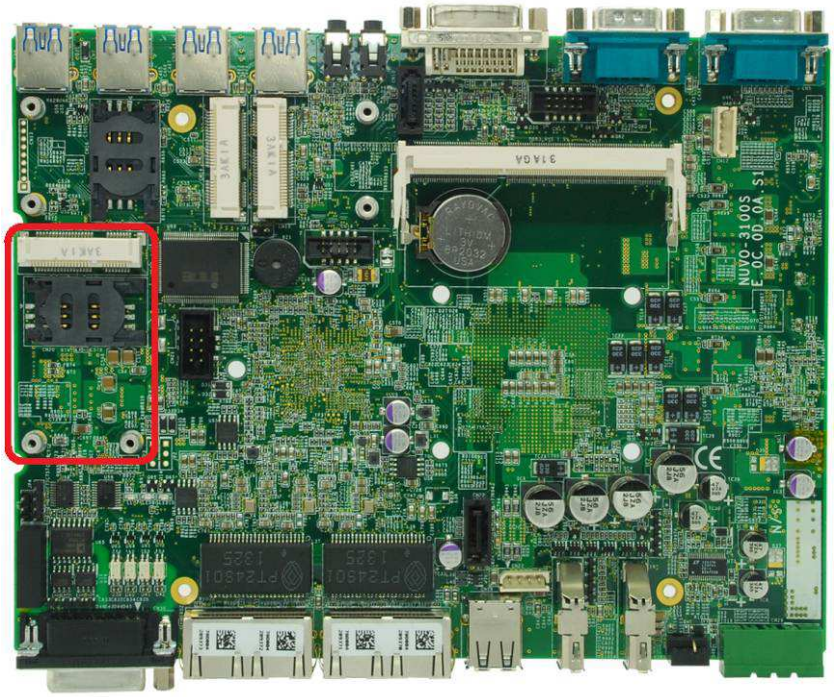
2.4.3 SATA Port for HDD Tray (Nuvo-3100VTC Only)



Nuvo-3100 series provides internal SATA ports to accommodate SATA hard drives. Each SATA port is composed of a 7-pin SATA connector and a 4-pin power connector. SATA#2 Port is assembled and connected to the hot-swappable HDD tray of Nuvo-3100VTC. For information of accessing the hot-swappable HDD tray, please refer to section 3.2.2 for detail.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.4.4 Full-Size Mini-PCIe Connector (with SIM Socket)

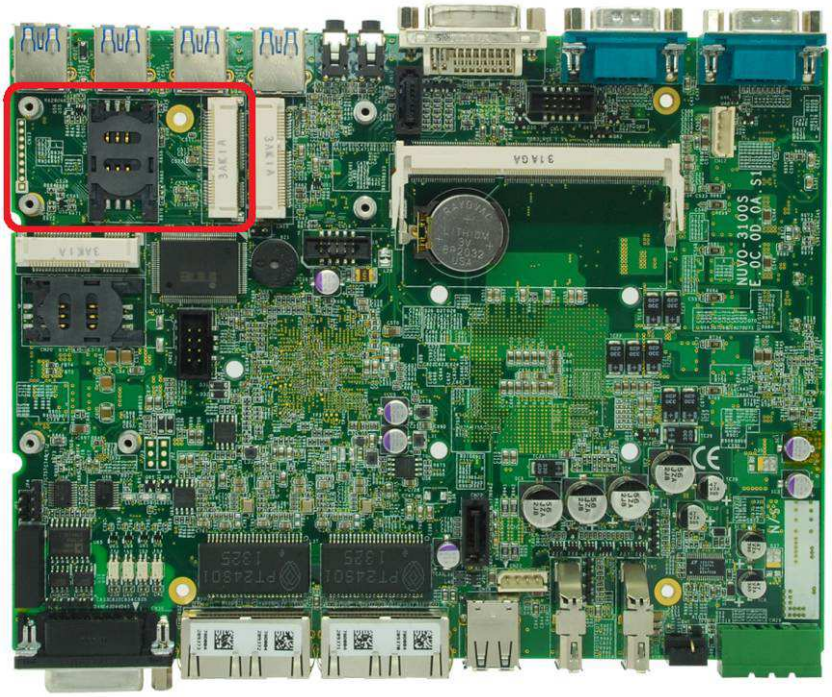


Nuvo-3100 series provides three on-board mini-PCIe/mSATA connectors. The full-size mini-PCIe connector is come with x1 PCI Express and USB signals, as well as a SIM socket support. It is designed for installing off-the-shelf LTE/3G/GPRS/GPS module. With a SIM card installed, it's capable to connect your system to Internet in wide territory through telecom operator's GPRS/3G network. A dedicated LED indicator on front panel presents the status of wireless communication for this full-size mini-PCIe socket.

Nuvo-3100 series also provides multiple SMA antenna apertures on the back panel for antenna installation.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.4.5 Full-Size mSATA Connector (with SIM Socket)

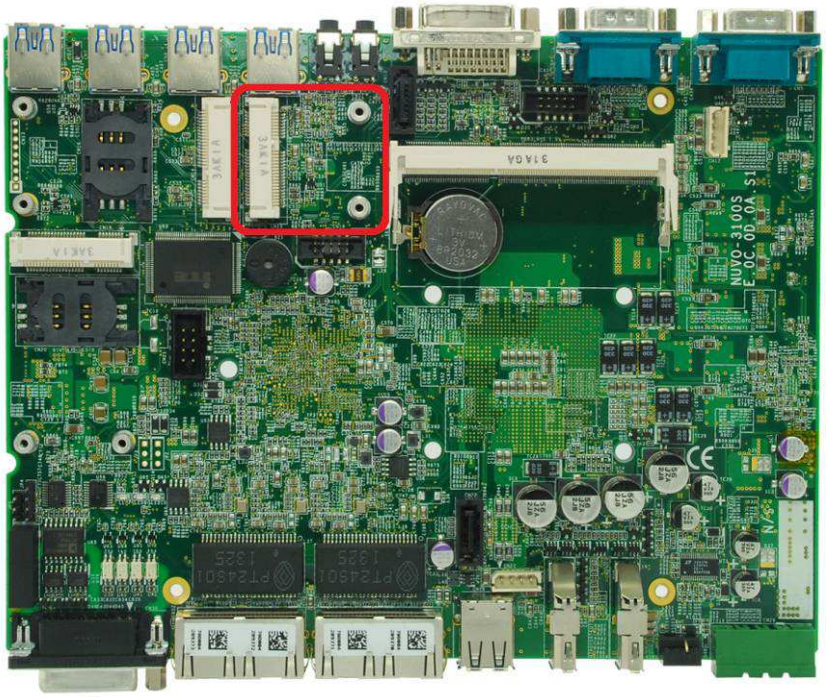


Nuvo-3100 series provides three on-board mini-PCIe/mSATA connectors. The full-size mSATA connector is come with mSATA and USB signals, as well as a SIM socket support. In addition to mSATA SSD, you can also install a 3G/GPRS/GPS module to this connector as most off-the-shelf 3G/GPRS/GPS modules require USB connectivity only. With the SIM support, it's capable to connect your system to Internet in wide territory through telecom operator's GPRS/3G network. A dedicated LED indicator on front panel presents the status of wireless communication for this full-size mSATA socket.

Nuvo-3100 series also provides multiple SMA antenna apertures on the back panel for antenna installation.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.4.6 Half-Size Mini-PCIe Connector



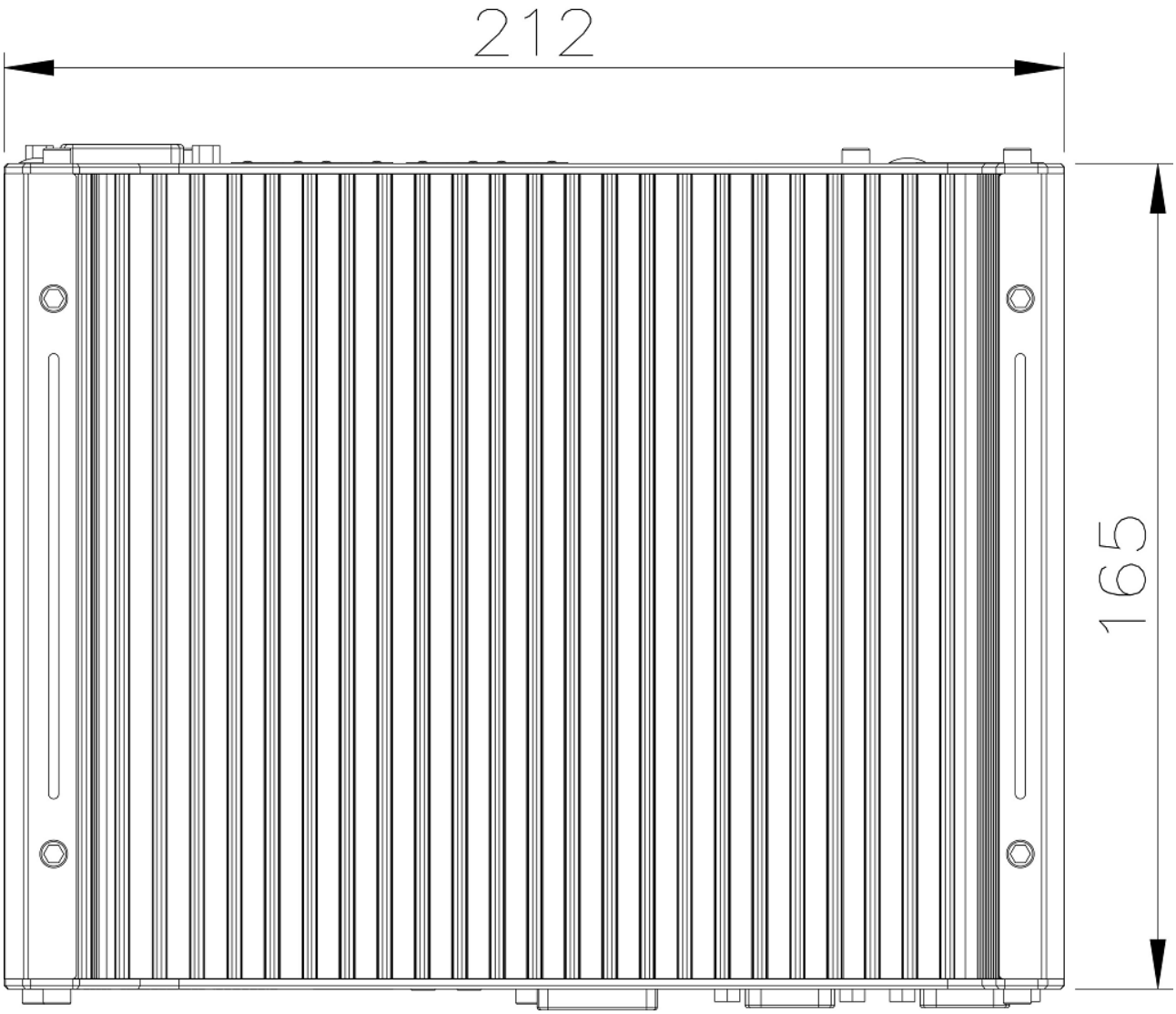
Nuvo-3100 series provides three on-board mini-PCIe/mSATA connectors. The half-size mini-PCIe connector is come with x1 PCI Express and USB signals. It is designed to work with a mini-PCIe WIFI module as the majority of WIFI modules are in half-size form-factor. A dedicated LED indicator on front panel presents the status of wireless communication for this half-size min-PCIe socket.

Nuvo-3100 series also provides multiple SMA antenna apertures on the back panel for antenna installation.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

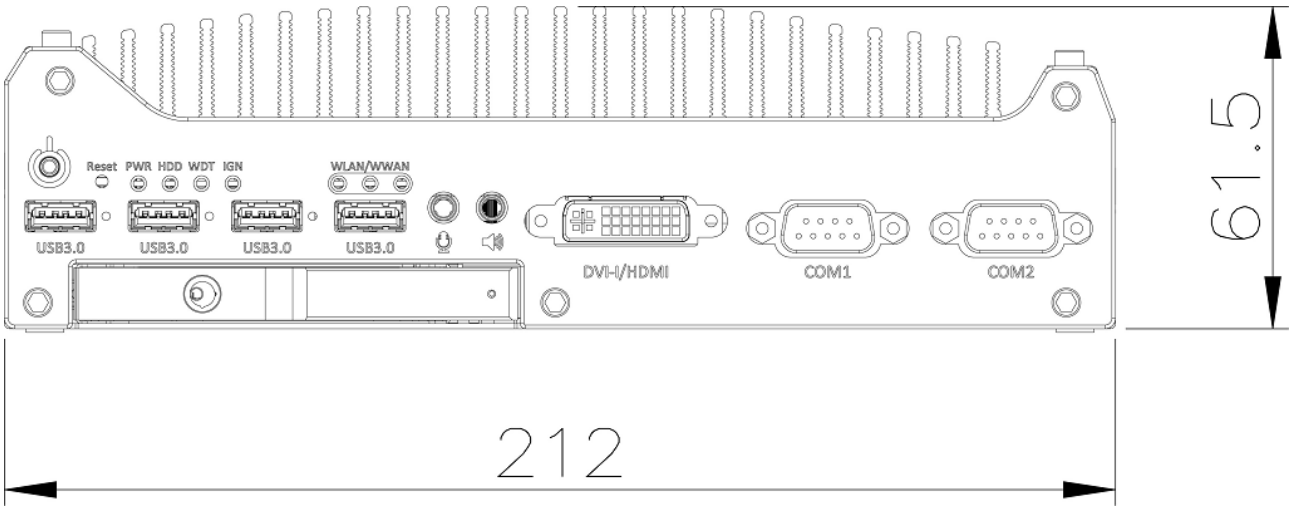
2.5 Mechanical Dimension

2.5.1 Top View of Nuvo-3100VTC



Copyright © 2014 Neousys Technology Inc. All Right Reserved.

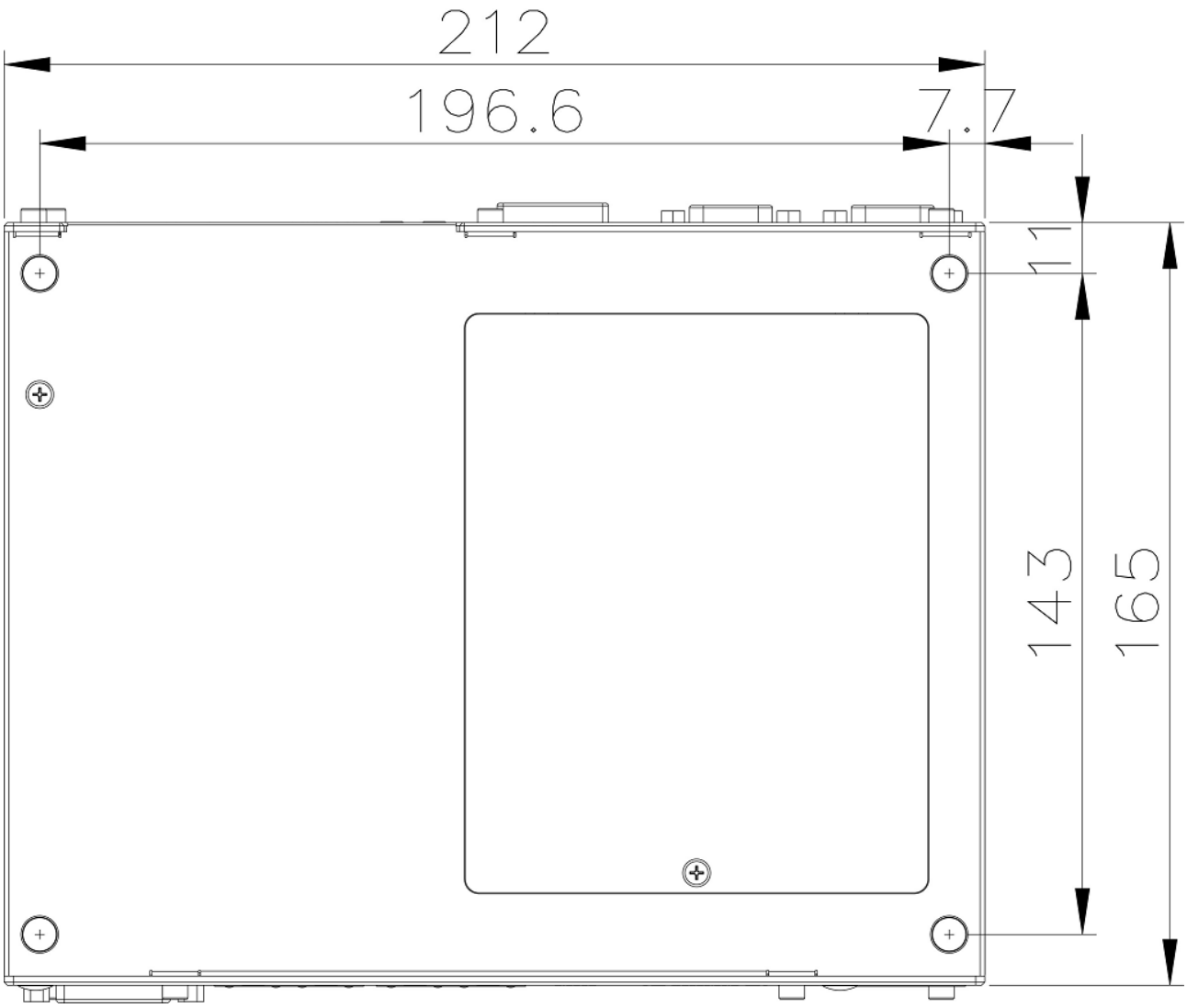
2.5.2 Front View of Nuvo-3100VTC



2.5.3 Side View of Nuvo-3100VTC

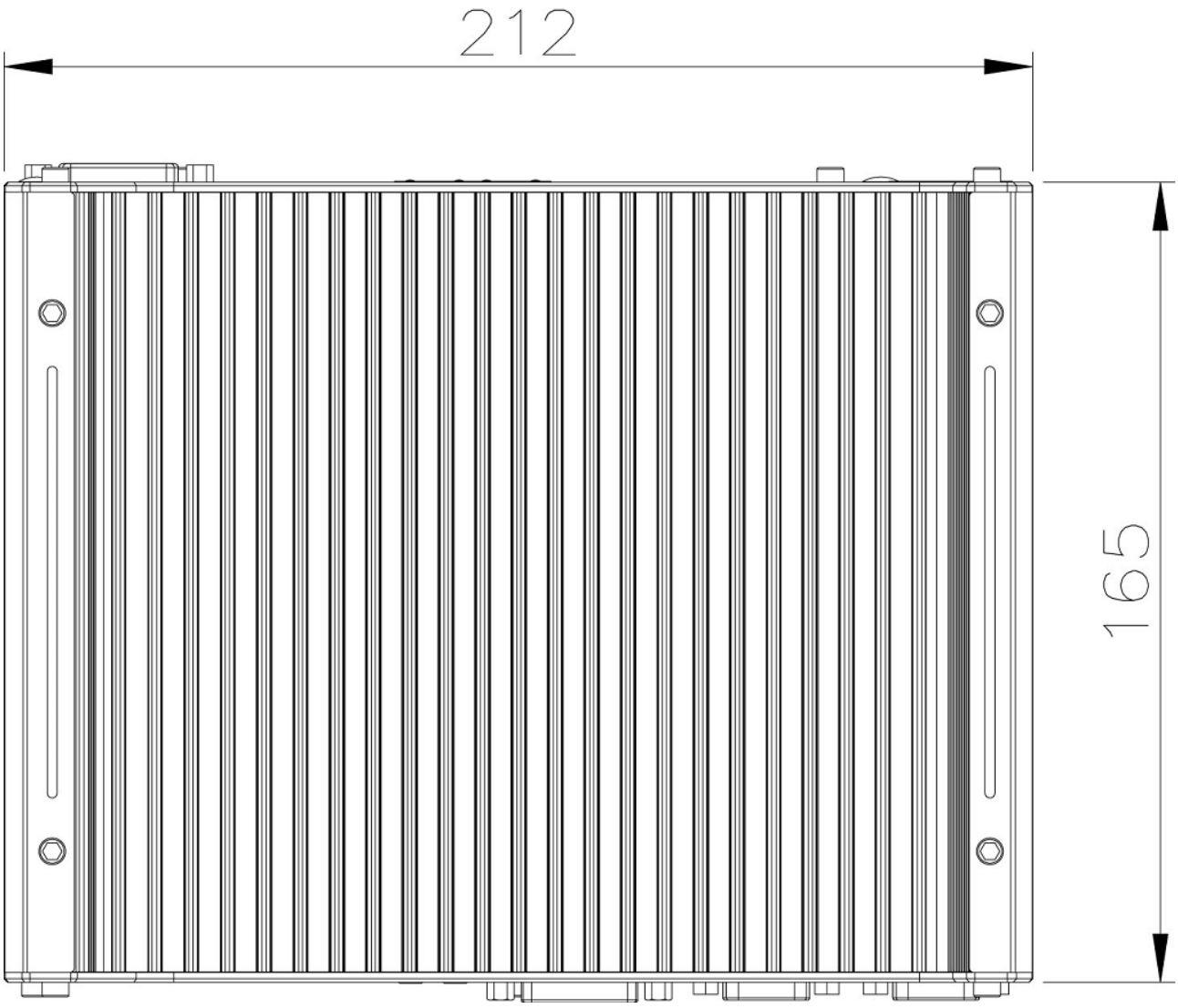
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.5.4 Bottom View of Nuvo-3100VTC



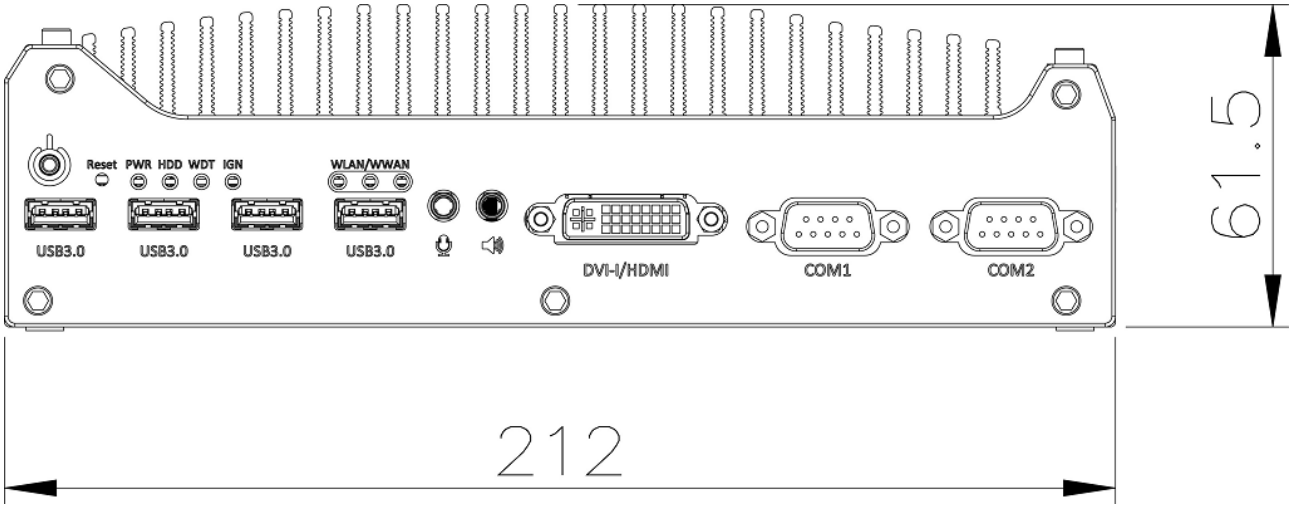
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.5.5 Top View of Nuvo-3120

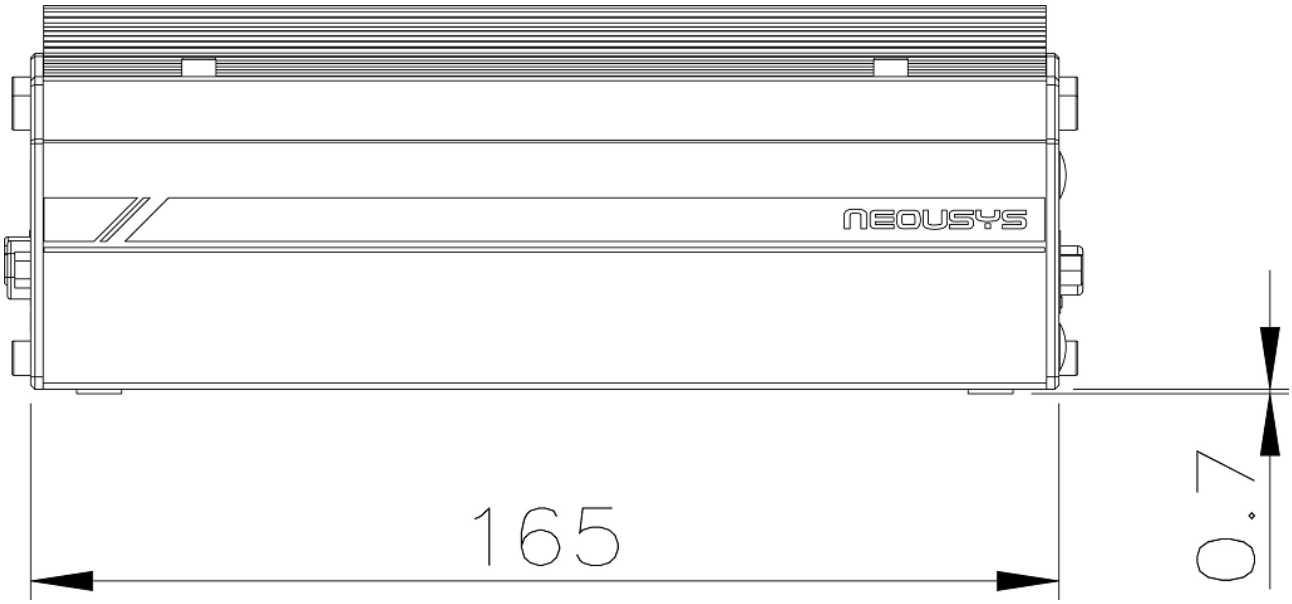


Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.5.6 Front View of Nuvo-3120

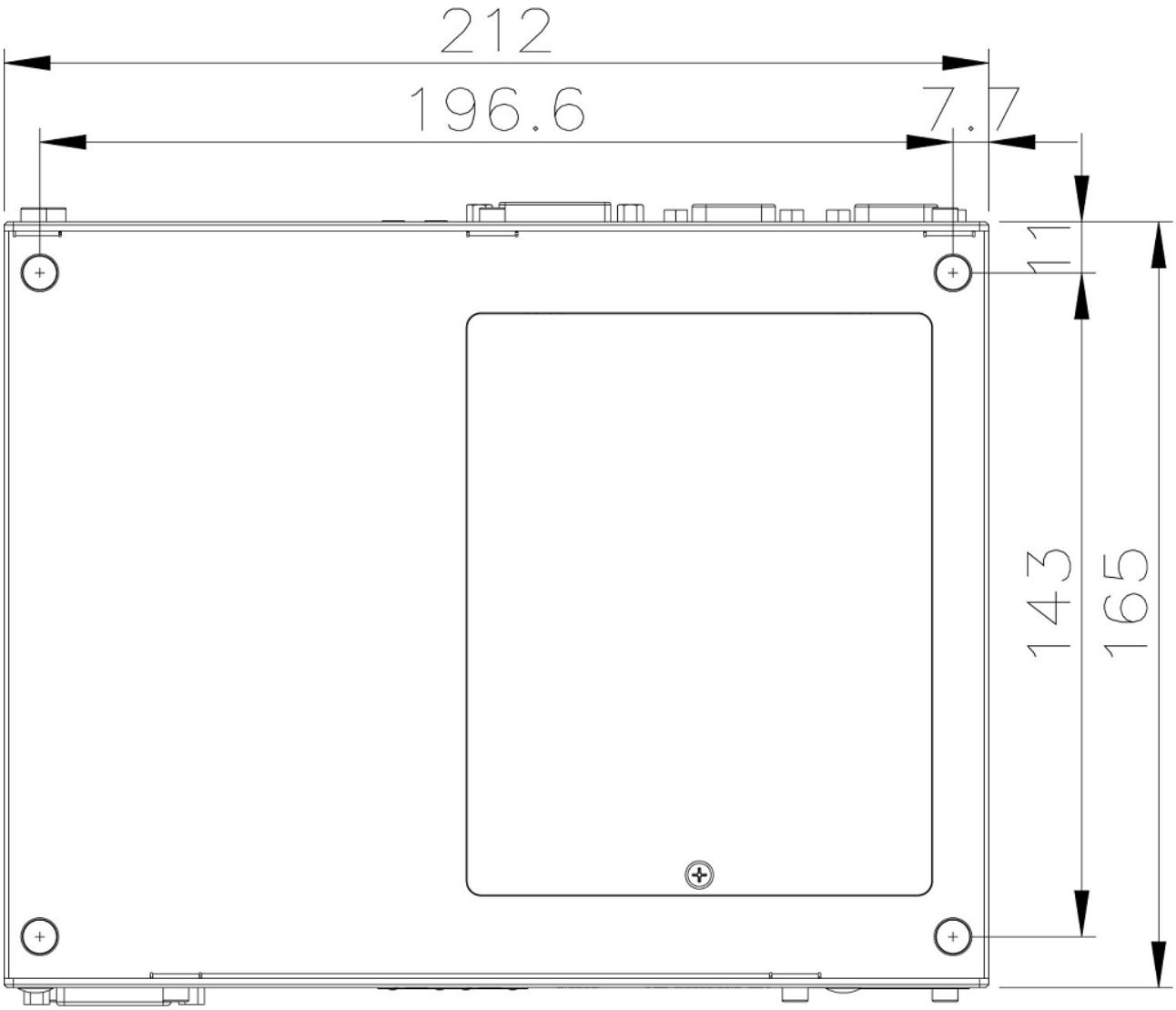


2.5.7 Side View of Nuvo-3120



Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2.5.8 Bottom View of Nuvo-3120



Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Chapter 3 Getting Start

3.1 Install DDR3 SODIMM Modules

Nuvo-3100 series provides one 204-pin, SODIMM socket for installing DDR3 memory module. It supports a maximal 8GB capacity by installing one 8GB DDR3 1600MHz SODIMM module. You can install/replace DDR3 SODIMM modules by following the steps listed below.

3.1.1 Install DDR3 SODIMM Module to Nuvo-3100VTC

1. Put the Nuvo-3100VTC upside down on a flat surface. You can see the "Pet-Door" exposed. Use a Philips screwdriver to loosen the M3 flat-head screw and open it.

2. When the "Pet-Door" of Nuvo-3100VTC opened, you can see the DDR3 204-pin SODIMM socket.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3. Tile the SODIMM module and insert it to the SODIMM socket. As it's firmly contacted with socket connector, press it down until the clamps of the socket snap into the latching position of SODIMM module.

4. Tilt the HDD assembly and insert the wedge of HDD bracket to the bottom cover. Once it's firmly wedged, push it down and fix it using a M3 flat-head screw.

3.1.2 Install DDR3 SODIMM Module to Nuvo-3120

1. Put the Nuvo-3120 upside down on a flat surface. You can see the "Pet-Door" exposed. Use a Philips screwdriver to loosen the M3 flat-head screw and open it.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2. When the "Pet-Door" of Nuvo-3120 opened, you can see the DDR3 204-pin SODIMM socket.

3. Tile the SODIMM module and insert it to the SODIMM socket. As it's firmly contacted with socket connector, press it down until the clamps of the socket snap into the latching position of SODIMM module.

4. Tilt the HDD assembly and insert the wedge of HDD bracket to the bottom cover. Once it's firmly wedged, push it down and fix it using a M3 flat-head screw.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

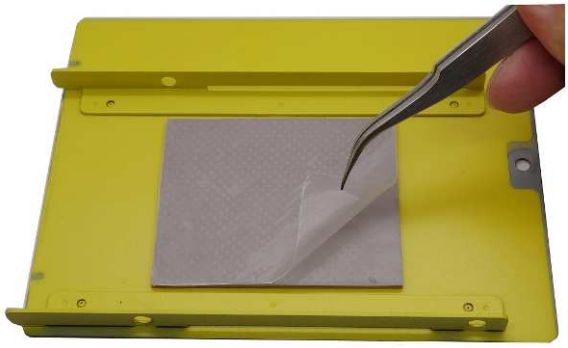
3.2 Install 2.5" HDD/SSD

One Internal SATA port on Nuvo-3100 is used in conjunction with the HDD bracket on "Pet-Door" to accommodate a 2.5" HDD/SSD. The other is a 2.5" hot-swappable HDD tray which provide and convenient storage access and robust data integrity. You can install/replace the HDD/SSD attached to SATA port by following the steps listed below.

3.2.1 Install 2.5" HDD to Pet-Door of Nuvo-3100VTC

1. Put the Nuvo-3100VTC upside down on a flat surface. You can see the "Pet-Door" along with HDD bracket exposed. Use a Philips screwdriver to loosen the M3 flat-head screw and open it.

2. Get the HDD thermal pad from the accessory box. Remove the protective films (two sides) and place it on the HDD bracket.



Place the HDD into the bracket and gently push it down to make it firmly attach to the thermal pad. Use a Philips screwdriver to fix the HDD with M3 flat-head screws. Please note that the HDD must be placed in the right direction as below.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

(another 2 screws are on the opposite side)

3. Pull out the SATA cable inside the chassis and connect it to HDD

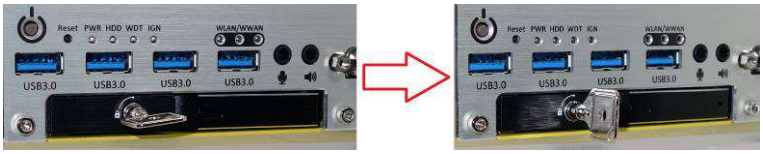
4. Tilt the HDD assembly and insert the wedge of HDD bracket to the bottom cover. Once it's firmly wedged, push it down and fix it using a M3 flat-head screw.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

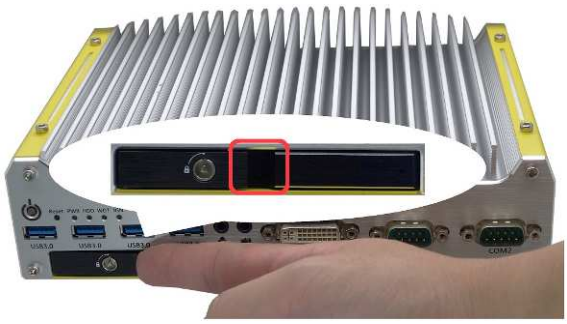
3.2.2 Install 2.5" HDD to hot-swappable HDD tray of Nuvo-3100VTC

1. Find the hot-swappable HDD tray door on the front panel of Nuvo-3100VTC.

2. Get the key for the hot-swappable HDD tray door from the accessory box and unlock it.



3. Pull the handle of the tray door to open the hot-swappable HDD tray.

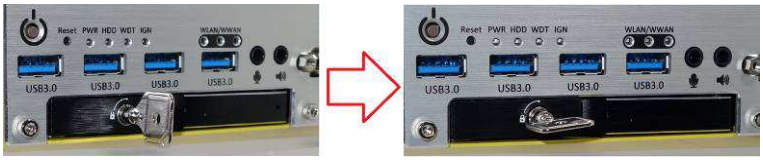


4. Insert the 2.5" HDD into the hot-swappable HDD tray, and please note the HDD direction when you install it.

5. Push the handle back to the HDD tray along with the 2.5" HDD till it snaps into the latching position.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

6. Use the key to lock the HDD tray door and secure the HDD.



3.2.3 Install 2.5" HDD to Pet-Door of Nuvo-3120

1. Put the Nuvo-3120 upside down on a flat surface. You can see the "Pet-Door" along with HDD bracket exposed. Use a Philips screwdriver to loosen the M3 flat-head screw and open it.

2. Get the HDD thermal pad from the accessory box. Remove the protective films (two sides) and place it on the HDD bracket.

3. Place the HDD into the bracket and gently push it down to make it firmly attach to the thermal pad. Use a Philips screwdriver to fix the HDD with M3 flat-head screws. Please note that the HDD must be placed in the right direction as below.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

(another 2 screws are on the opposite side)

4. Pull out the SATA cable inside the chassis and connect it to HDD

5. Tilt the HDD assembly and insert the wedge of HDD bracket to the bottom cover. Once it's firmly wedged, push it down and fix it using a M3 flat-head screw.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3.3 Install Mini-PCIe Module

3.3.1 Install Mini-PCIe Module to Nuvo-3100VTC

1. Put the Nuvo-3100VTC upside down on a flat surface. You can see the "Pet-Door" along with HDD bracket exposed. Use a Philips screwdriver to loosen the M3 flat-head screw and open then remove it.

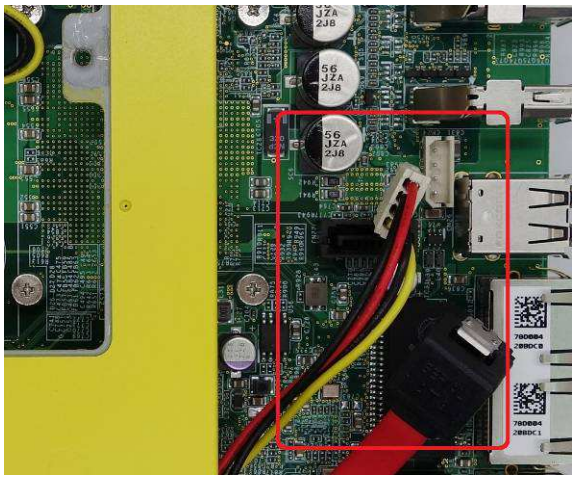
2. Turn your Nuvo-3100VTC to normal position. Unscrew 4 hex bolts on the top of the heat sink.

2. Unscrew 5 hex bolts on the front panel and remove the front panel.

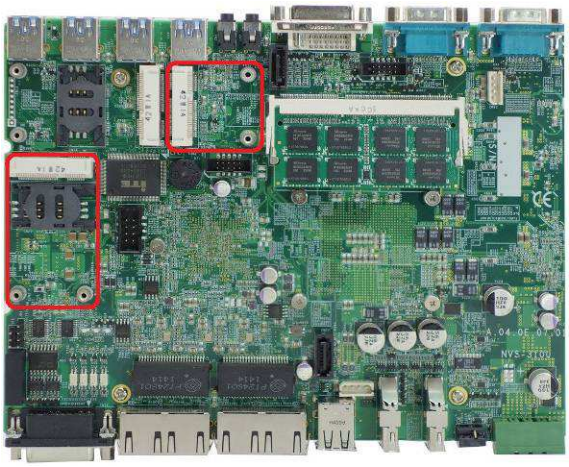
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3. Unscrew 4 hex bolts on the back panel and remove the back panel.

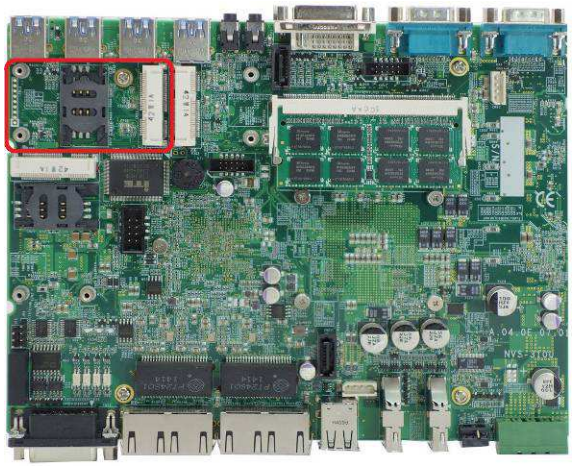
4. Gently slide out the bottom cover from Nuvo-3100VTC PCBA/heat-sink assembly till the SATA signal and power cable for HDD tray exposed. After removing cables from the connectors, continue slide bottom cover out.



5. You can see two SIM card, one half-size mini-PCIe, one full-size mini-PCIe and one mSATA socket exposed.



(full-size & half-size mini-PCIe socket)

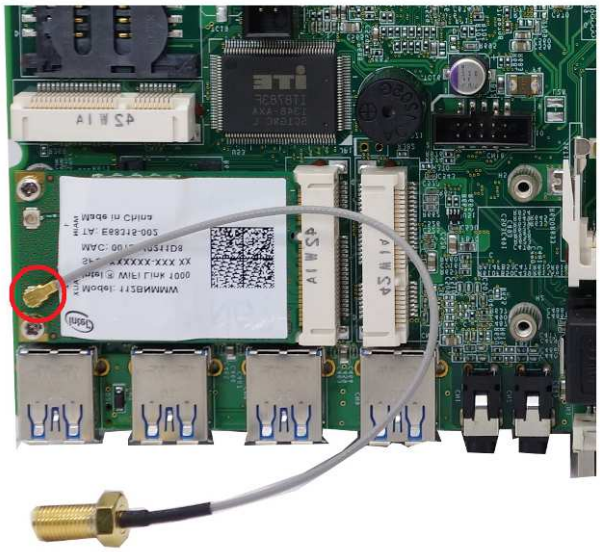


(mSATA socket)

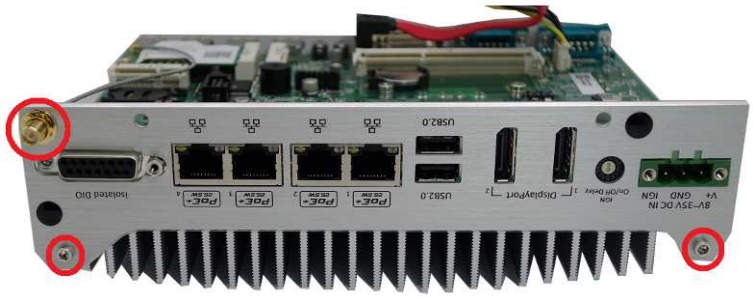
6. Tilt the mini-PCIe module and insert it into the mini-PCIe/mSATA socket. And fix the module with two M2.5 P-head screws.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

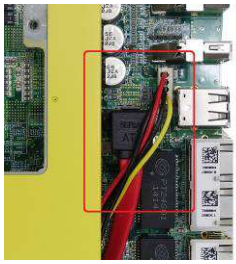
7. Attach the IPEX-to-SMA cable to the module if needed.



8. Assemble back panel to Nuvo-3100VTC PCBA/heat-sink assembly and fix 2 hex bolts. Then fix the SMA connector of the IPEX-to-SMA cable to the back panel.



9. Assemble bottom cover with Nuvo-3100VTC PCBA/heat-sink assembly, and push it back till the SATA signal and power cables for HDD tray reaches the connectors. Plug the SATA and power cable into connectors then push the bottom cover till it's fully attached to back panel.

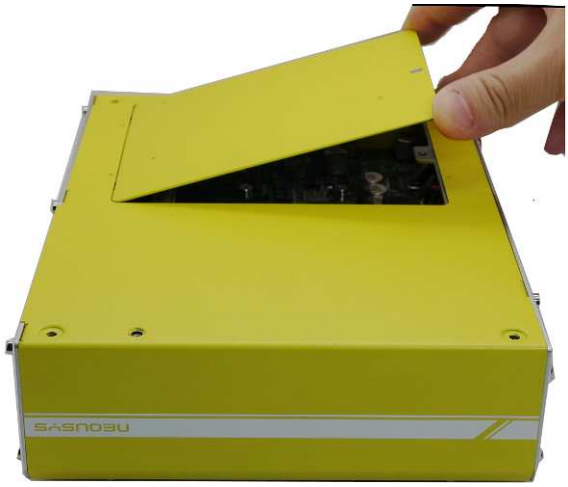


Copyright © 2014 Neousys Technology Inc. All Right Reserved.

10. Fix 2 hex bolts on the back-panel.

11. Assemble the front panel with Nuvo-3100VTC PCBA/heat-sink assembly and fix 5 hex bolts on it.

12. Tilt the HDD assembly and insert the wedge of HDD bracket to the bottom cover. Once it's firmly wedged, push it down and fix it using a M3 flat-head screw.



13. Attach the antenna to the SMA connector.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3.3.2 Install Mini-PCIe Module to Nuvo-3120

1. Put the Nuvo-3120 upside down on a flat surface. You can see the "Pet-Door" along with HDD bracket exposed. Use a Philips screwdriver to loosen the M3 flat-head screw and open then remove it.

2. Turn your Nuvo-3120 to normal position. Unscrew 4 hex bolts on the top of the heat sink.

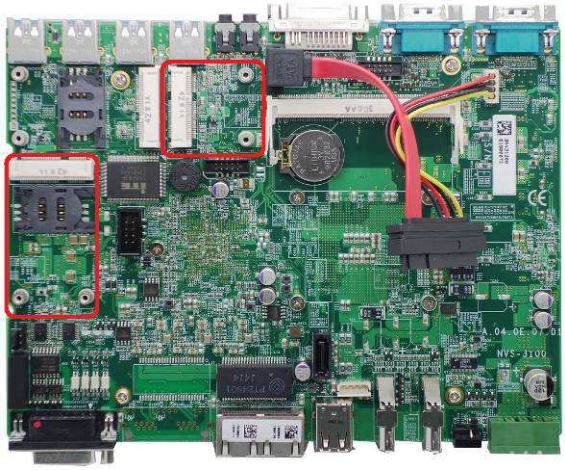
3. Unscrew 5 hex bolts on the front panel and remove the front panel.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

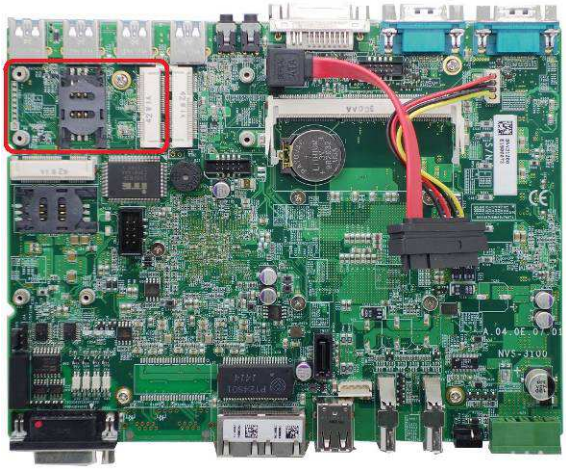
4. Unscrew 4 hex bolts on the back panel and remove the back panel.

5. Gently slide out the bottom cover of Nuvo-3120.

6. You can see two SIM card, one half-size mini-PCIe, one full-size mini-PCIe and one mSATA socket exposed.



(full-size & half-size mini-PCIe socket)

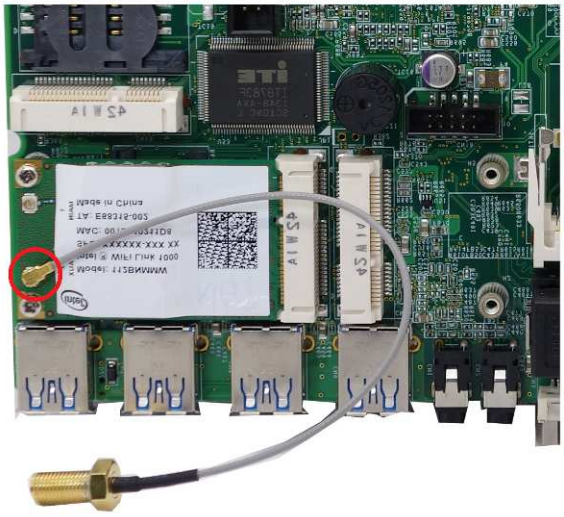


(mSATA socket)

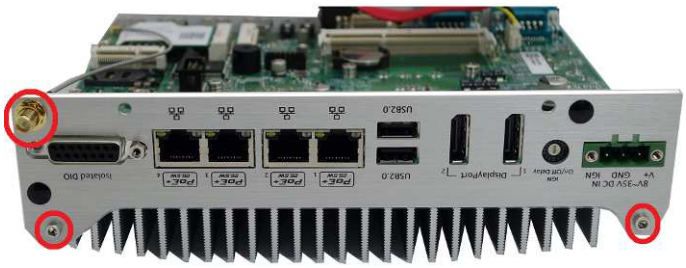
7. Tilt the mini-PCIe/mSATA module and insert it to the mini-PCIe/mSATA socket. And fix the module with two M2.5 P-head screws.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

8. Attach the IPEX-to-SMA cable to the module if needed.



9. Assemble back panel with Nuvo-3120 PCBA/heat-sink assembly and fix 2 hex bolts. Then fix the SMA connector of the IPEX-to-SMA cable to the back panel.



10. Assemble bottom cover with Nuvo-3120 PCBA/heat-sink assembly, and push it back till it's attached to the back panel.

11. Fix 2 hex bolts on the back-panel.

12. Assemble the front panel with Nuvo-3120 PCBA/heat-sink assembly and fix 5 hex bolts on it.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

13. Tilt the HDD assembly and insert the wedge of HDD bracket to the bottom cover. Once it's firmly wedged, push it down and fix it using a M3 flat-head screw

14. Attach the antenna to the SMA connector.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

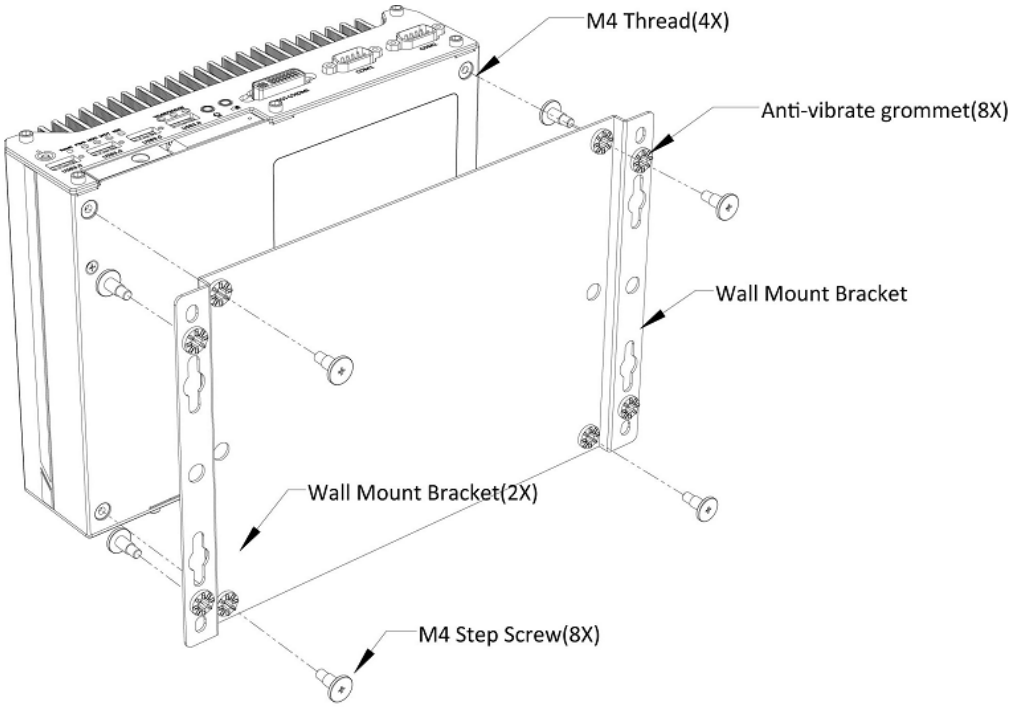
3.4 Mount your Nuvo-3100 Series

Nuvo-3100 series provides versatile ways of mounting. Nuvo-3100VTC is shipped with dedicated damping brackets for in-vehicle installation. Or you can use wall-mounting brackets shipped with Nuvo-3120 to mount it on the wall/surface. Neousys also offers optional bracket and DIN rail clip to mount Nuvo-3100VTC/3120 on a DIN rail. To mount your Nuvo-3100 series, please refer to the information listed below.

3.4.1 Mount your Nuvo-3100VTC with Dedicated Damping Brackets

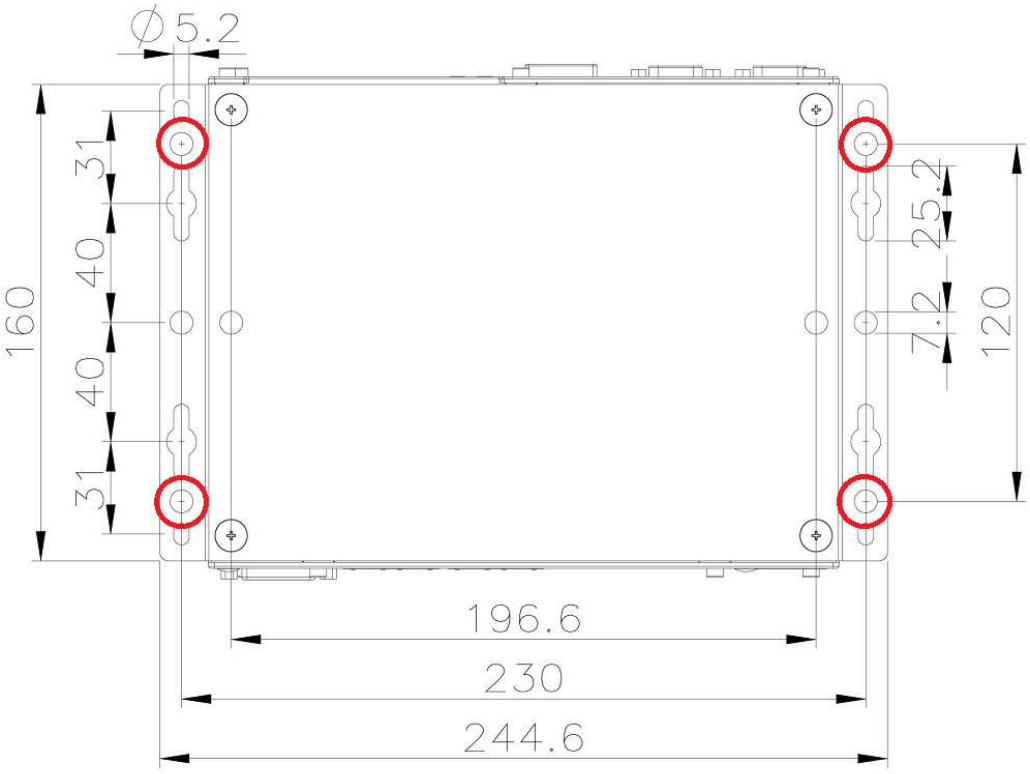
Considering in-vehicle deployment, Nuvo-3100VTC is shipped with dedicated damping bracket to absorb shock/vibration. You can mount your Nuvo-3100VTC with damping bracket by following the steps listed below.

1. Get damping bracket, eight M4 step screws and eight shock-absorbing grommets from the accessory box.
2. Insert the grommets into the brackets. Fix the damping brackets to Nuvo-3100VTC using four M4 step screws.



3. Place Nuvo-3100VTC on a flat surface and fix it to the surface with another four M4 step screws. Make sure the mounting holes on the surface follow the correct pitch as below.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

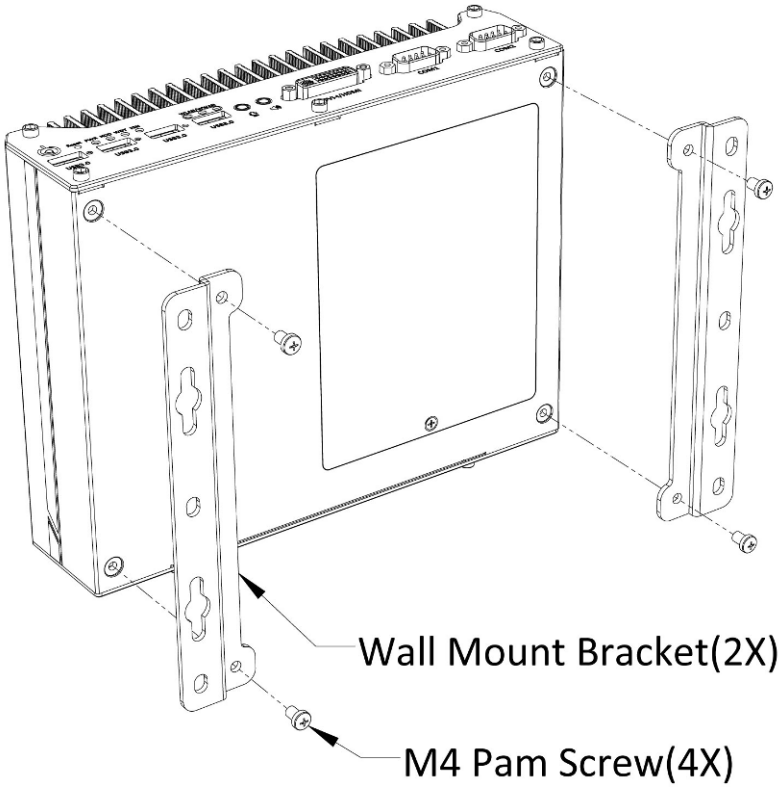


3.4.2 Mount your Nuvo-3120 on the Wall/Surface

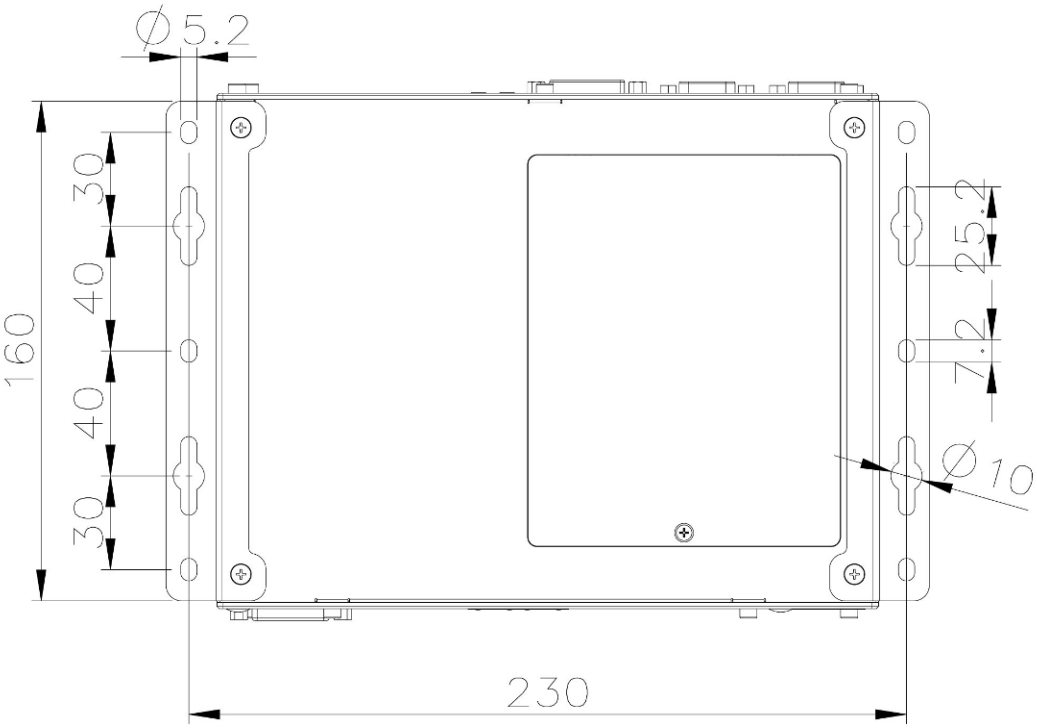
Nuvo-3120 is shipped with wall-mount brackets as the standard mounting option. You can mount your Nuvo-3120 on the wall/surface by following the steps listed below.

1. Get two wall-mounting brackets and four M4 screws from the accessory box. Fix the mounting brackets to Nuvo-3120 using M4 screws.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

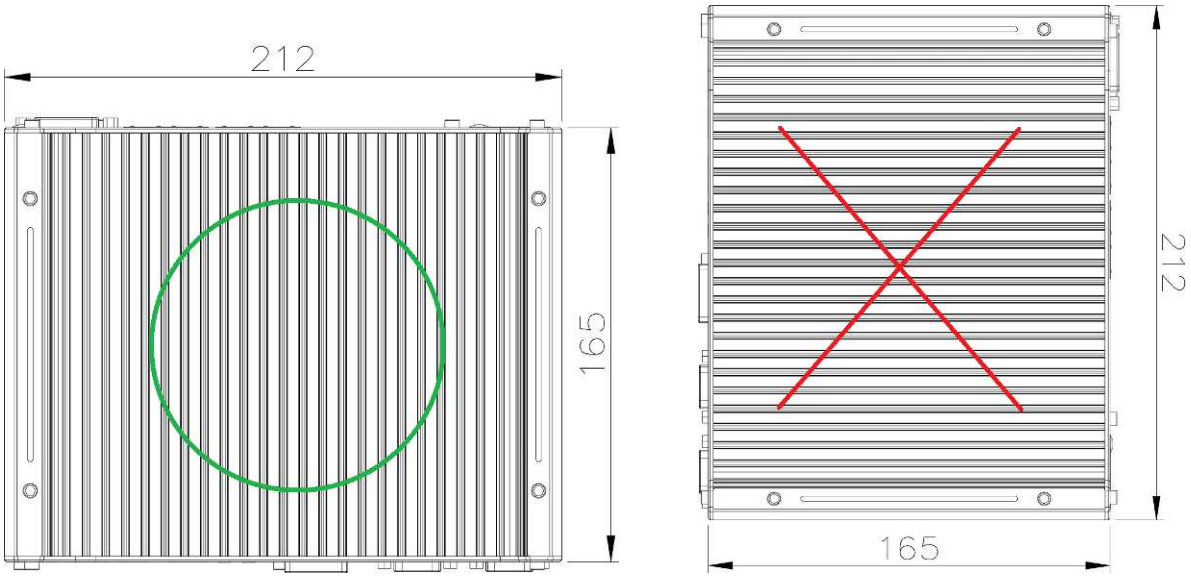


2. Place Nuvo-3120 on a flat surface and fix it with screws. You can also take advantage of the keyhole-shaped holes of mounting brackets to suspend Nuvo-3120 on the Wall.



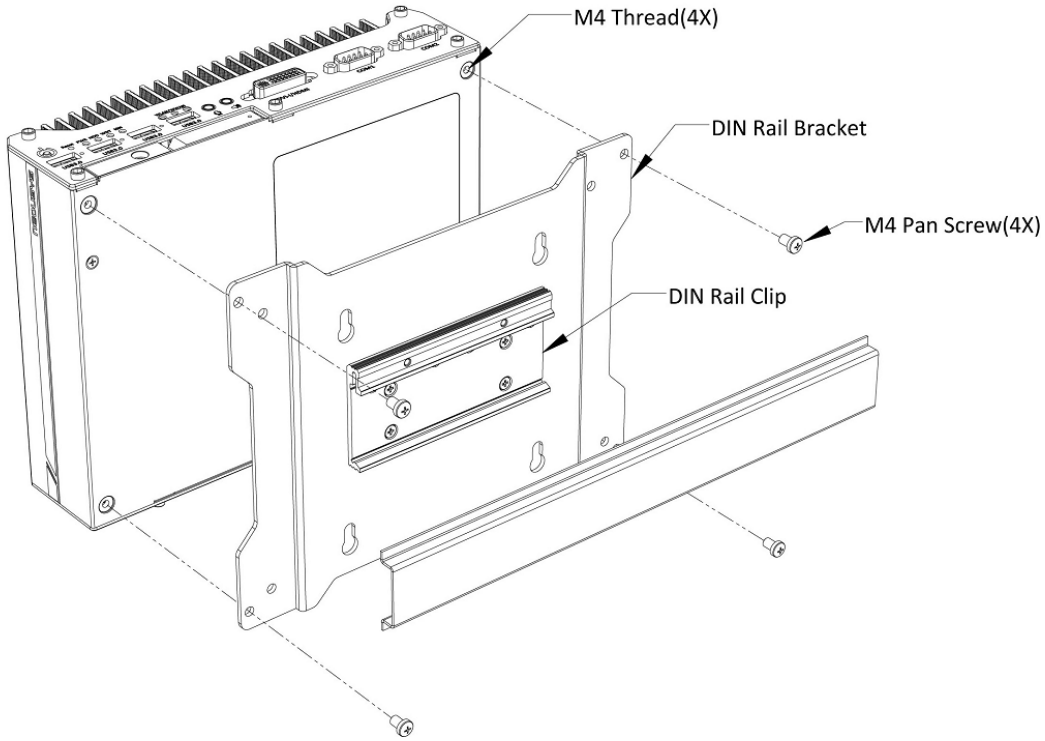
3. For best efficiency of heat dissipation, please mount Nuvo-3120 in a right direction.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.



3.4.3 Mount your Nuvo-3100 Series on the DIN Rail

Neousys also provides the option of the DIN-rail mounting kit. The kit includes a bracket and a DIN-rail mounting clip. You should fix the clip to the bracket using four M4 flat-head screws first, and then fix the bracket assembly to Nuvo-3100 series with another four M4 screws. This option can be useful if you want to deploy Nuvo-3100 series inside an equipment cabinet where DIN rail is available.

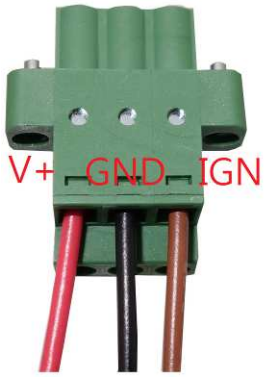


Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3.5 Connect DC power to you Nuvo-3100 Series

Nuvo-3100 series uses a 3-pin pluggable terminal block to accept 8~35V DC power input. It provides the way for directly wiring the DC power. To connect DC power via the 3-pin pluggable terminal block, please follow the steps listed below.

1. Make sure the external DC power supply is power off or disconnected before wiring.
2. Get the 3-pin pluggable terminal block from the accessory box. The terminal block fits the wires with a gauge of 12~24 AWG.
3. Carefully identify the positive and negative contacts of your DC power supply and pluggable terminal block. The polarities between DC power supply and terminal block must be positive (+) to positive (+) and ground (GND) to ground (GND). Insert the wires to correct contacts of pluggable terminal block and tighten clamping screws using a Philips screwdriver.



4. Firmly plug the terminal block into a receptacle on the back panel, and tighten the captive screws using a Slotted screwdriver.

Caution

1. *Nuvo-3100 series accepts 8~35 VDC when using terminal block for DC input. Please make sure the voltage and polarity of DC power is correct before you connect it to Nuvo-3100 series. Supplying a voltage over 35V will damage the system.*

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3.6 Power on your Nuvo-3100 Series

For better flexibility of operation, Nuvo-3100 series provides three alternatives to power on your Nuvo-3100. You can turn on your Nuvo-3100 by pressing the power button, using an external non-latched on/off switch, or by sending a special LAN packet. In this section, we illustrate these ways to power on your Nuvo-3100.

3.6.1 Power on Nuvo-3100 Series Using the Power Button

This is the simplest way to turn on your Nuvo-3100 series. The power button on the front panel is a non-latched switch and behaves the ATX-mode on/off control. As DC power is connected, push the power button will turn on the system as well as the PWR LED indicator. Push the button when system is on will turn off the system. If your operating system supports ATX power mode (i.e. Microsoft Windows or Linux), push the power button causes a pre-defined system behavior, such as shutdown or hibernation.

3.6.2 Power on Nuvo-3100 Series Using External Latched Switch

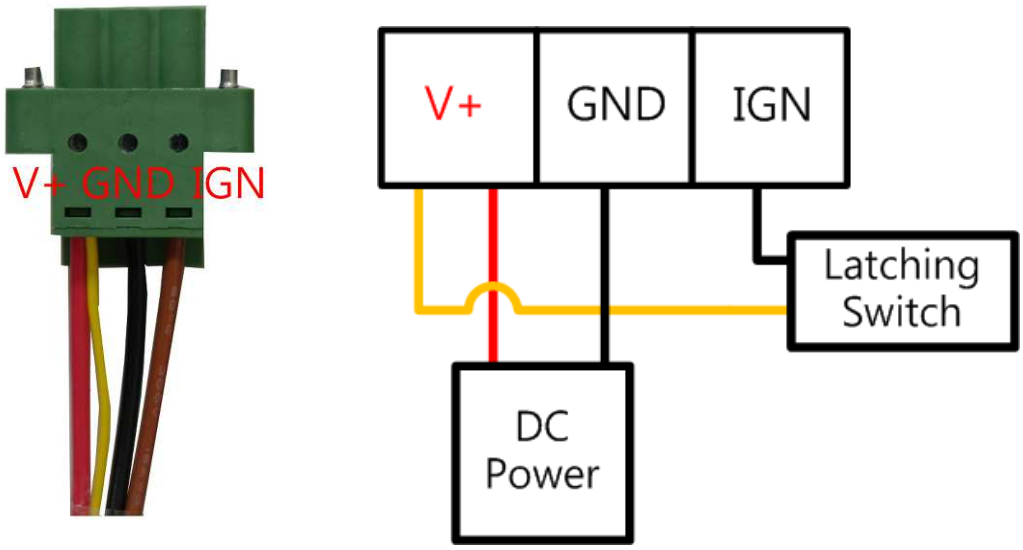
For applications which place Nuvo-3100 series inside a cabinet, it's useful to control the on/off of the system using an external switch. You can take advantage of V+ and IGN input of Nuvo-3100VTC/3120 to connect the latched switch for remote on/off control. To power on Nuvo-3100VTC/3120 using an external latched switch, please follow the steps listed below

Note: This function is available for Nuvo-3100VTC/3120 Rev. A2 or later revision.

1. Set the IGN On/Off Delay rotary switch to position 2.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

2. Prepare a latching switch and connect it to V+ and IGN of the 3-pin pluggable terminal block (polarity is negligible).



3. When the switch is closed, a power-on operation is initiated to turn on the system. When the switch is opened, a system shutdown process is initiated to turn off the system (soft-off).

3.6.3 Power on Nuvo-3100 Series Using Wake-on-LAN Function

Wake-on-LAN (WOL) is a mechanism to wake up a computer system from a S5 (system off with standby power) state via issuing a magic packet. Nuvo-3100 series implements the Wake-on-LAN function for its first GbE port.

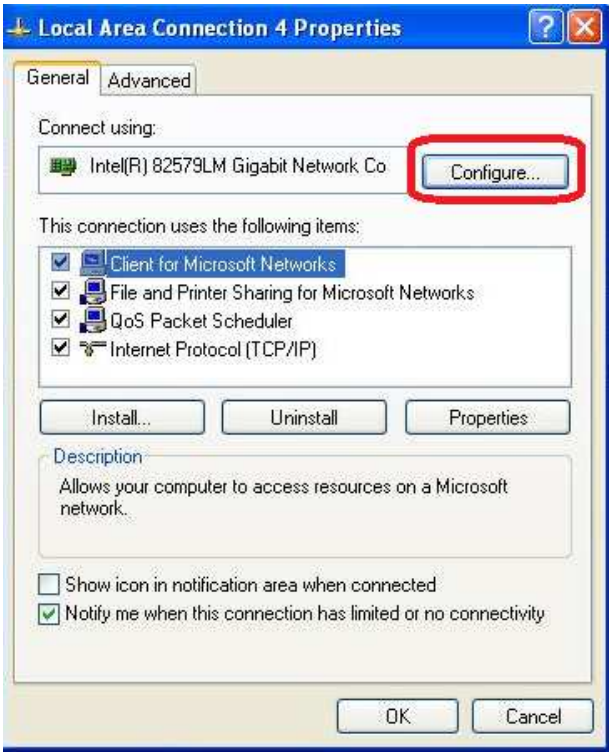
To enable WOL function and power on you Nuvo-3100 series, please follow the steps listed below.

For Windows XP

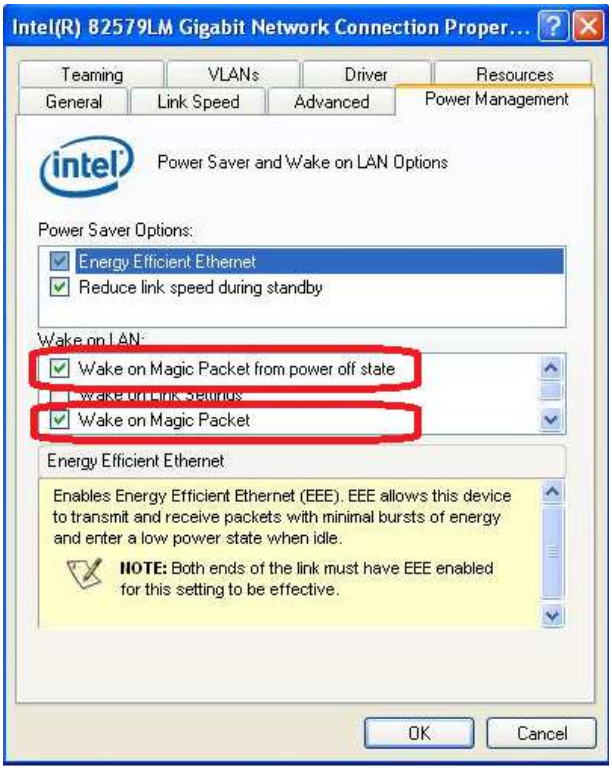
1. When Nuvo-3100 series boots up, press F2 to enter BIOS setup utility.
2. Enter the **[Power]** menu. And configure the **[Wake On LAN]** option as **[Enabled]**. This setting enables the Wake-on-LAN function for Nuvo-3100 series. Please refer to section 4.1.8 for the instruction of configuring this BIOS option.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3. In Windows XP system, identify the Local Area Connection of Intel® 82579LM Gigabit Controller and click the **Configure** button.



Click the Power Management tag, and configure the following two options accordingly.


Intel(R) 82579LM Gigabit Network Connection Proper...
Teaming
VLANs
Driver
Resources
General
Link Speed
Advanced
Power Management
Power Saver and Wake on LAN Options
Power Saver Options:
Energy Efficient Ethernet
Reduce link speed during standby
Wake on LAN:
Wake on Magic Packet from power off state
Wake on Magic Packet
Energy Efficient Ethernet
Enables Energy Efficient Ethernet (EEE). EEE allows this device to transmit and receive packets with minimal bursts of energy and enter a low power state when idle.
NOTE: Both ends of the link must have EEE enabled for this setting to be effective.
OK
Cancel

- **Wake on Magic Packet**

  Nuvo-3100 series can wake from S5 state when receiving a magic packet. The magic packet is a broadcast frame containing anywhere within its payload 6 bytes of all 255 (FF FF FF FF FF FF in hexadecimal), followed by sixteen repetitions of the target computer's 48-bit MAC address.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

For example, NIC's 48-bit MAC Address is 78h D0h 04h 0Ah 0Bh 0Ch

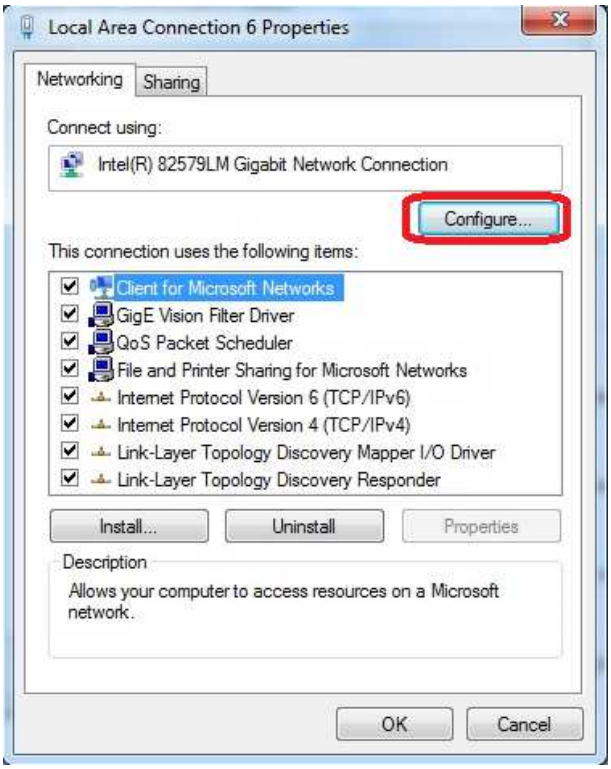
DESTINATION SOURCE MISC
FF FF FF FF FF FF
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
MISC CRC

There are some free tools available on Internet that can be used to send a magic packet. Please refer to the following link to understand more about Magic Packet.
http://en.wikipedia.org/wiki/Wake-on-LAN

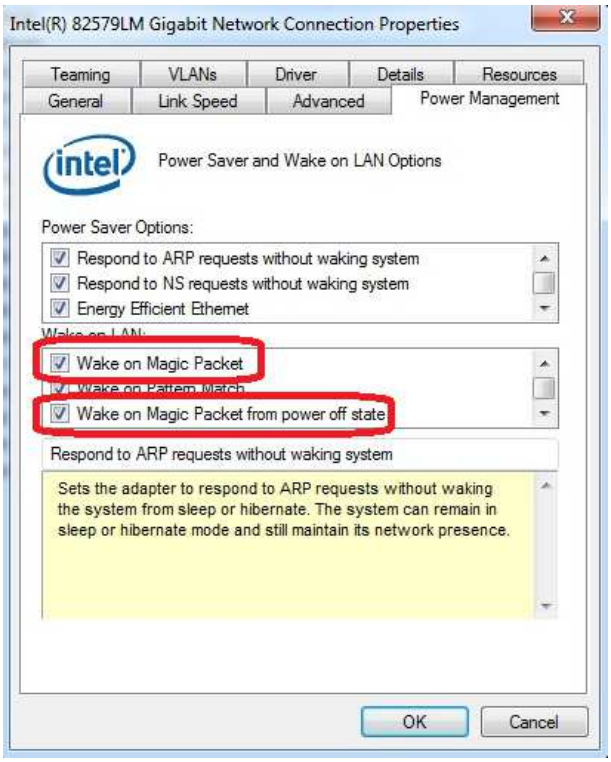
For Windows 7

1. When Nuvo-3100 boots up, press F2 to enter BIOS setup utility.
2. Enter the **[Power]** menu. And configure the **[Wake On LAN]** option as **[Enabled]**. This setting enables the Wake-on-LAN function for Nuvo-3100 series. Please refer to section 4.1.8 for the instruction of configuring this BIOS option.
3. In Windows 7 system, identify the Local Area Connection of corresponding Intel® I210 Gigabit Controller and click the **Configure** button.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.



4. Click the **Power Management** tag, and check the following two options accordingly


Intel(R) 82579LM Gigabit Network Connection Properties
Teaming
VLANs
Driver
Details
Resources
General
Link Speed
Advanced
Power Management
Power Saver and Wake on LAN Options
Power Saver Options:
Respond to ARP requests without waking system
Respond to NS requests without waking system
Energy Efficient Ethernet
Wake on Magic Packet
Wake on Magic Packet from power off state
Respond to ARP requests without waking system
Sets the adapter to respond to ARP requests without waking the system from sleep or hibernate. The system can remain in sleep or hibernate mode and still maintain its network presence.
OK
Cancel

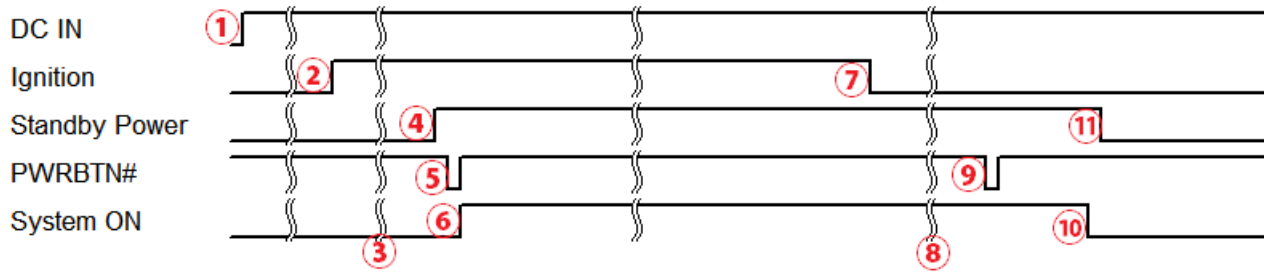
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3.7 Ignition Power Control (Nuvo-3100VTC Only)

Nuvo-3100VTC implements the feature of ignition power control module for in-vehicle applications. It's a MCU-based implementation that monitors the ignition signal and reacts to turn on/off the system according to predefined on/off delay. Its built-in algorithm supports further features such as ultra-low standby power, battery-low protection, system hard-off and etc. In this section, we'll illustrate the principle of ignition power control and operations modes on Nuvo-3100VTC.

3.7.1 Principle of Ignition Power Control

The basic concept of ignition power control module is to control the timing correlation between ignition signal and system power status. A typical timing correlation can be described in following diagram.



1) When DC input is supplied to Nuvo-3100VTC, MCU starts to periodically detect ignition signal. Note that only MCU is working at this moment and the overall power consumption is less than 2 mW.
2) Ignition signal is active. (Both 12VDC and 24VDC ignition signals are accepted)
3) MCU starts to count a pre-defined power-on delay.
4) Once power-on delay expired, MCU turns on necessary standby power for Nuvo-3100VTC (3.3VSB & 5VSB).
5) A PWRBTN# pulse is then issued to turn on the system (a similar behavior as you press the power button on the front panel).
6) Nuvo-3100VTC is booting up and running.
7) After a period of time, the ignition signal is inactive.
8) MCU starts to count a pre-defined power-off delay.
9) Once power-off delay expired, another PWRBTN# pulse is issued to perform a soft-off for the system (ex. a normal shutdown process for Windows system).
10) Nuvo-3100VTC is completely shut down.
11) As MCU detects system is off, it turns off the standby power for Nuvo-3100VTC, and then operates in low power mode again (< 2mW power consumption).

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

In addition to the typical timing correlation, the ignition power control module offers some further features to make Nuvo-3100VTC more reliable for in-vehicle applications.

1. Low battery detection
   The ignition power control module is capable to continuously monitor the voltage of DC input when system is running. If input voltage is less than 9V (for 12VDC input) or less than 18V (for 24VDC input) over a 60 seconds duration, it will shut down the system automatically.
2. Guarded power-on/power-off delay duration
   If ignition signal goes inactive during the power-on delay duration, the ignition power control module will cancel the power-on delay process and go back to idle status. Likewise if ignition signal goes active during the power-off delay duration, the ignition power control module will cancel the power-off delay process and keep the system running.
3. System hard-off
   In some cases, system may be failed to normally shutdown via a soft-off operation due to system/application halts. The ignition power control module on Nuvo-3100VTC offers a mechanism called "hard-off" to handle this unexpected condition. By detecting the system status, it can determine whether the system is normally shutdown. If not, the ignition power control module will compulsively cut off the system power 10 minutes after the power-off delay duration.
4. Smart off-delay
   The ignition power control module on Nuvo-3100VTC offers two modes (mode 6 & mode 7) which have very long power-off delay duration for applications require some off-line processing after vehicle is stopped. In these two modes, the ignition power control module will automatically detect the system status during the power-off delay duration. If the system is shutdown (by the application software) in prior to power-off delay expired, it will cut off the system power immediately to prevent further consumption of battery power.

3.7.2 Wiring Ignition Signal

To have ignition power control for in-vehicle usage, you need to supply IGN signal to Nuvo-3100VTC. The IGN input is located on the back panel via a 3-pin pluggable terminal

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

block (shared with DC power input). Here is a general wiring configuration for in-vehicle deployment.

1. Connect car Battery+ line (12V for sedan, 24V for bus/truck) to V+.
2. Connect car Batter-/GND line to GND.
3. Connect ACC line to IGN.

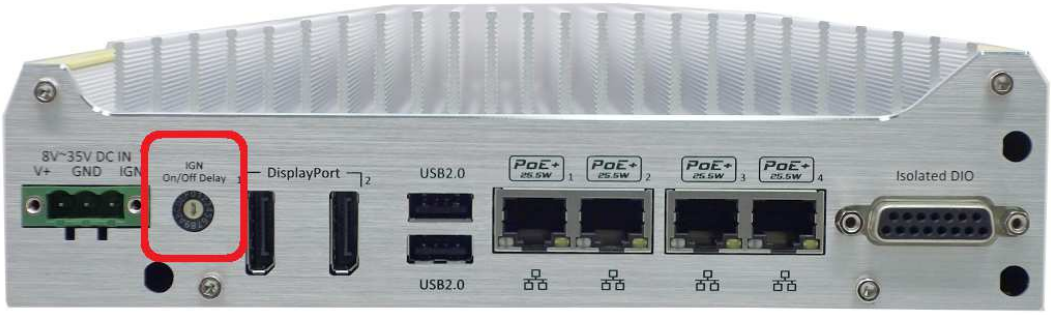
Note

1. *Please make sure your DC power source and IGN signal share the same ground.*
2. *IGN input of Nuvo-3100VTC accepts 8~35VDC. Supply a voltage higher than 35VDC may damage the system.*

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3.7.3 Operation Modes of Ignition Power Control

If the option of ignition power control modules is available, you can use the rotary switch on SBC to configure the operation mode. Nuvo-3100VTC offers 8 operation modes (Rev. A1) or 16 operation mode (Rev. A2 or later) with different power-on/power-off delay configurations.



Note

For Nuvo-3120 Rev. A1 (S/N from E2500001 to E2500100), please always set the rotary switch to 8 otherwise the system may be failed to operate.

For Nuvo-3100VTC Rev. A1

- **Mode 0**

  Mode 0 is the ATX mode without power-on and power-off delay. User can only use the power button on the front panel to turn on or turn off the Nuvo-3100VTC system.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
0	N/A	N/A	N/A

- **Mode 1**

  If Mode 1 is specified, the system automatically turns on the system when DC power is applied. A retry mechanism is designed to repeat the power-on cycle if the system is failed to boot up.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
1	N/A	N/A	N/A

- **Mode 2 / Mode 3 / Mode 4 / Mode 5**

  Mode 2 ~ Mode 5 are ignition power control modes with various power-on delay and power-off delay. Each mode supports a hard-off timeout of 10 minutes.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
2	10 seconds	10 seconds	10 minutes
3	30 seconds	1 minute	10 minutes

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4	30 seconds	5 minutes	10 minutes
5	30 seconds	30 minutes	10 minutes

- **Mode 6 / Mode 7**

  Mode 6 and Mode 7 are ignition power control modes with very long power-off delay. Both modes support the feature of "smart off-delay", which automatically detect system status during power-off delay duration and cut off system power if system is off in prior to power-off delay expired.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
6	30 seconds	2 hours	10 minutes
7	30 seconds	5 hours	10 minutes

For Nuvo-3100VTC Rev. A2

- **Mode 0**

  Mode 0 is the ATX mode without power-on and power-off delay. User can only use the power button on the front panel to turn on or turn off the Nuvo-3100VTC system.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
0	N/A	N/A	N/A

- **Mode 1**

  If Mode 1 is specified, the system automatically turns on the system when DC power is applied. A retry mechanism is designed to repeat the power-on cycle if the system is failed to boot up.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
1	N/A	N/A	N/A

- **Mode 2 (available for both Nuvo-3100VTC and Nuvo-3120)**

  Mode 2 is a special mode designed to support remote on/off control. User can use an external latched switch to connect the DC source (8~35V) and IGN input. When the switch is closed, IGN signal is asserted to initiate a power on operation. When the switch is opened, IGN signal is de-asserted and system shutdown operation is initiated. Neither power-on delay nor power-off delay is supported in this mode.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
2	N/A	N/A	N/A

- **Mode 3 ~ Mode 12**

  Mode 2 ~ Mode 12 are ignition power control modes with various power-on delay and power-off delay. Each mode supports a hard-off timeout of 10 minutes.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
3	10 seconds	10 seconds	10 minutes
4	10 seconds	1 minute	10 minutes
5	10 seconds	5 minutes	10 minutes
6	30 seconds	1 minute	10 minutes
7	30 seconds	5 minutes	10 minutes
8	30 seconds	10 minutes	10 minutes
9	3 minutes	1 minute	10 minutes
10	3 minutes	10 minutes	10 minutes
11	3 minutes	30 minutes	10 minutes
12	10 minutes	30 minutes	10 minutes

- **Mode 13 / Mode 14 / Mode 15**

  Mode 13, Mode 14 and Mode 15 are ignition power control modes with very long power-off delay. Both modes support the feature of "smart off-delay", which automatically detect system status during power-off delay duration and cut off system power if system is off in prior to power-off delay expired.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
13	30 seconds	2 hours	10 minutes
14	3 minutes	2 hours	10 minutes
15	30 seconds	5 hours	10 minutes

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Chapter 4 BIOS and Driver

4.1 BIOS Settings

Nuvo-3100 series is shipped with factory-default BIOS settings cautiously programmed for best performance and compatibility. In this section, we'll illustrate some of BIOS settings you may need to modify. Please always make sure you understand the effect of change before you proceed with any modification.

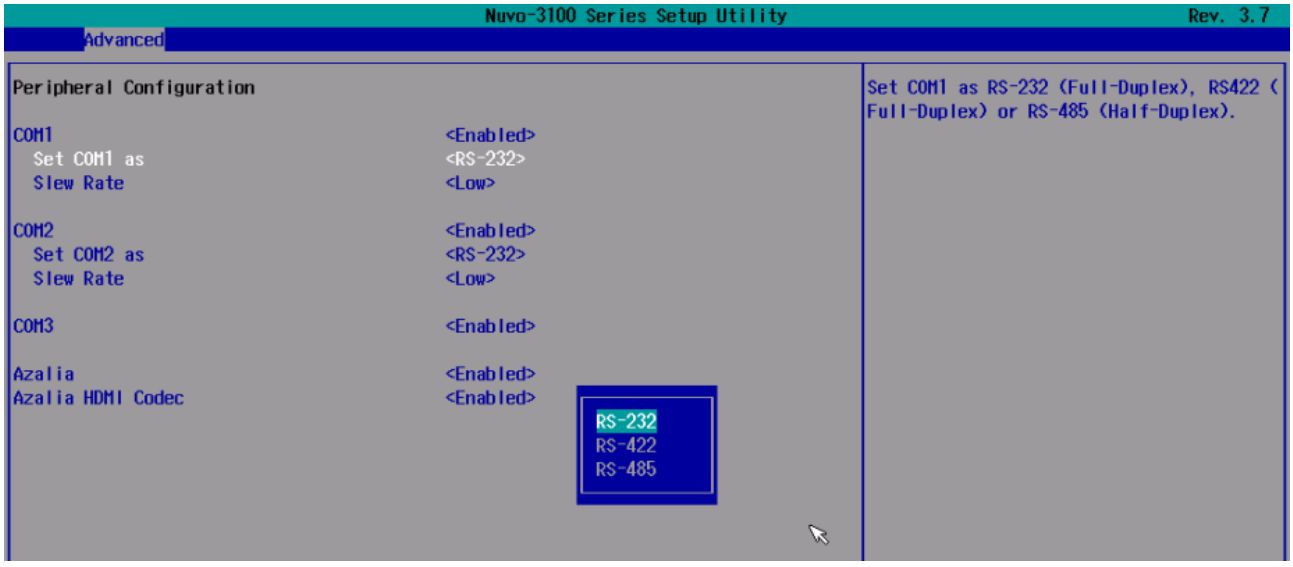
4.1.1 COM1 & COM2 Operating Mode

COM1 and COM2 of Nuvo-3100 series support RS-232 (full-duplex), RS-422 (full-duplex) and RS-485 (half-duplex) mode. You can set the COM1/COM2 operating mode via BIOS settings. Another option in BIOS called "*Slew Rate*" defines how sharp the rising/falling edge is for the output signal of COM1/COM2. For long-distance RS-422/485 transmission, you may set the "*Slew Rate*" option as "High" to improve signal quality.

.

To set COM1/COM2operating mode:

1. When Nuvo-3100 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[Peripheral Configuration]**.
3. Set the **[Set COM1 as]** to a proper mode for COM1 of your Nuvo-3100.
4. Set the **[Set COM2 as]** to a proper mode for COM2 of your Nuvo-3100.



Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.1.2 SATA Controller Mode for Nuvo-3100VTC

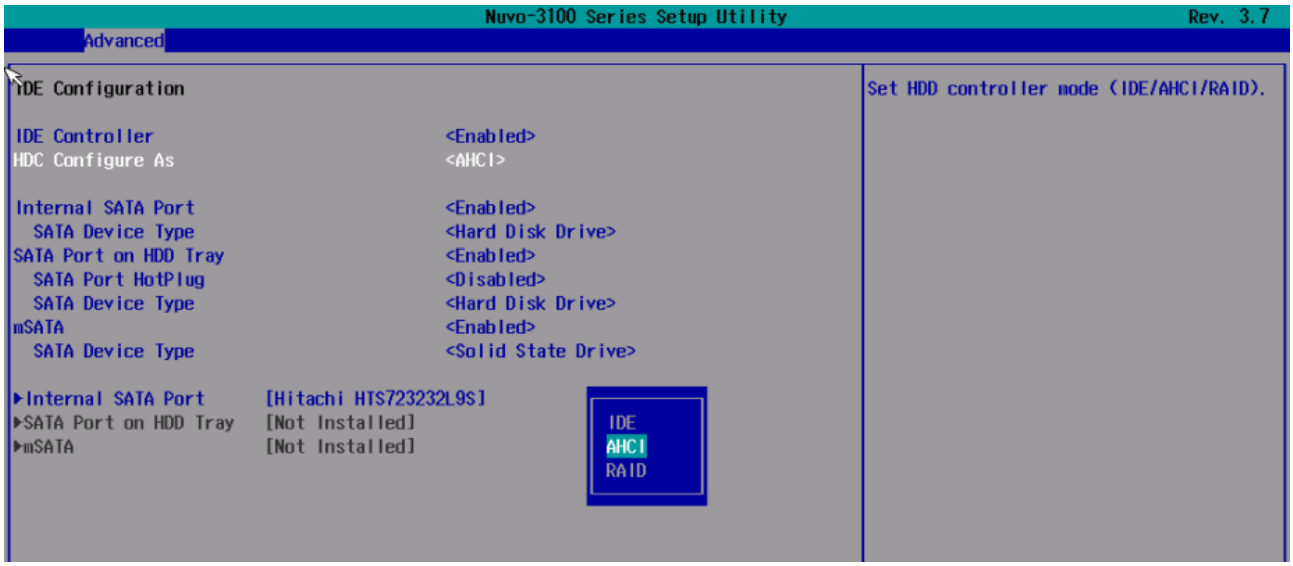
The SATA controller of Nuvo-3100VTC supports three operating modes: **IDE**, **AHCI** and **RAID** mode. **IDE** mode configures SATA controller to access SATA interface in legacy IDE mode, and is compatible with most storage devices. **AHCI** mode, which exposes SATA's advanced capabilities such as hot swapping and native command queuing, is supported in several later version of operating systems. **RAID** mode provides a more reliable data storage (RAID 1/5/10) or a higher disk access throughput (RAID 0). Nuvo-3100VTC features built-in hardware RAID. No additional H/W or driver is needed to use RAID function.

Our suggestion of how to set SATA controller mode is

- If you're using Windows XP, Linux kernel earlier than 2.6.19, you should select **IDE** mode.
- If you're using Windows Vista, Windows 7, Windows 8, or Linux kernel from 2.6.19 onward, you can select **AHCI** mode for better performance.
- If you're installing two 2.5" HDD/SSD and looking for data striping (RAID 0) or data mirroring (RAID 1), you can select **RAID** mode to utilize built-in RAID.

To set SATA controller mode:

1. When Nuvo-3100VTC boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[IDE Configuration]**.
3. Set the **[HDC Configure as]** to a proper mode for your Nuvo-3100VTC.



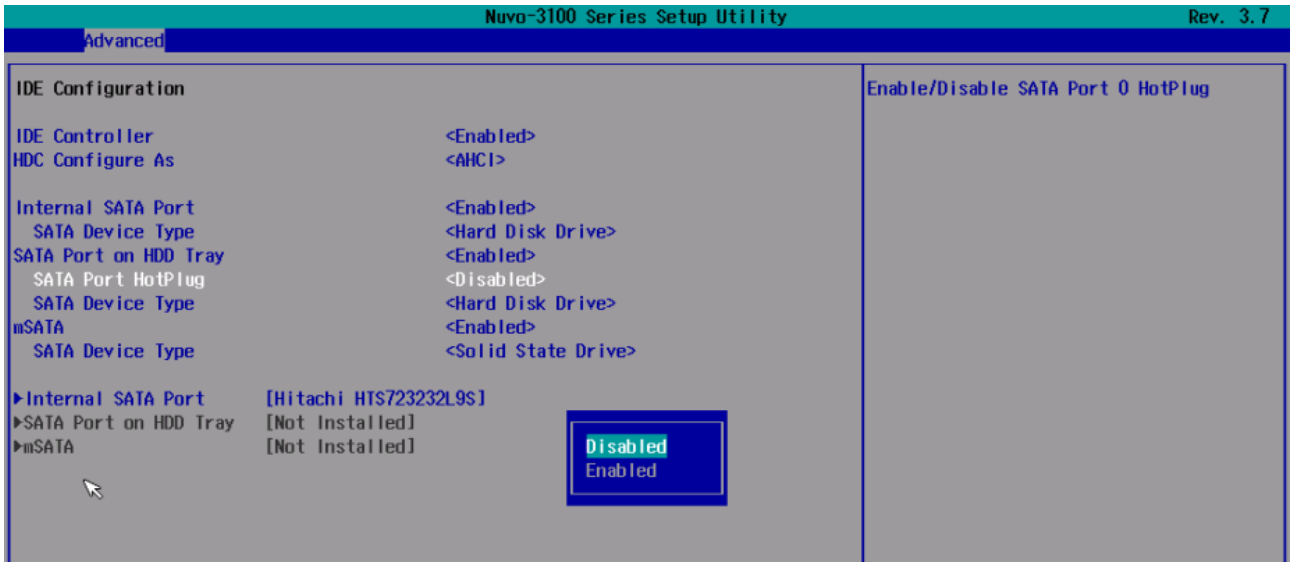
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.1.3 Configure Hot-Swappable HDD Tray of Nuvo-3100VTC

Nuvo-3100VTC features a hot-swappable HDD tray on its front panel for easy HDD access. The HDD tray can be configured as removable storage device so you can insert/remove a HDD/SSD when system's running, or configured as fixed storage device so you can install OS. You should configure operating mode of HDD tray according to your application.

To enable/disable hot-swap for HDD tray:

1. When Nuvo-3100VTC boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[IDE Configuration]**. An option named **[SATA Port HotPlug]** under **[SATA Port on HDD Tray]** is displayed.
3. If you need to configure the HDD tray as fixed storage device, please set the **[SATA Port HotPlug]** to **[Disabled]**.
4. If you need to configure the HDD tray as removable storage device, please set the **[SATA Port HotPlug]** to **[Enabled]**.



Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.1.4 SATA Controller Mode for Nuvo-3120

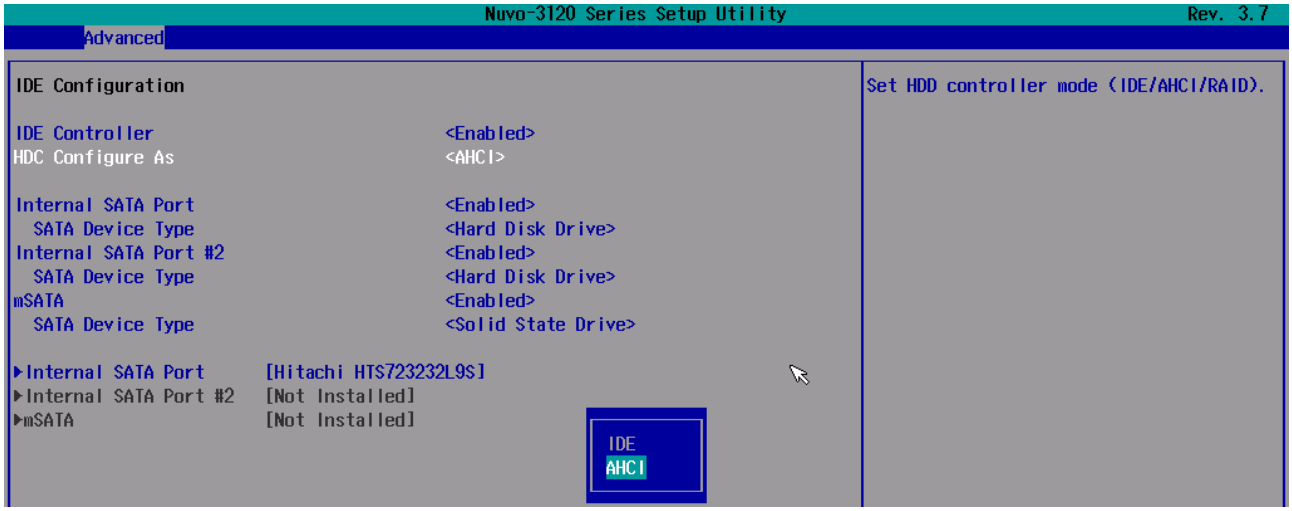
The SATA controller of Nuvo-3120 supports two operating modes: **IDE** and **AHCI** mode. **IDE** mode configures SATA controller to access SATA interface in legacy IDE mode, and is compatible with most storage devices. **AHCI** mode, which exposes SATA's advanced capabilities such as hot swapping and native command queuing, is supported in several later version of operating systems.

Our suggestion of how to set SATA controller mode is

- If you're using Windows XP, Linux kernel earlier than 2.6.19, you should select **IDE** mode.
- If you're using Windows Vista, Windows 7, Windows 8, or Linux kernel from 2.6.19 onward, you can select **AHCI** mode for better performance.

To set SATA controller mode:

1. When Nuvo-3120 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[IDE Configuration]**.
3. Set the **[HDC Configure as]** to a proper mode for your Nuvo-3100VTC.



Copyright © 2014 Neousys Technology Inc. All Right Reserved.

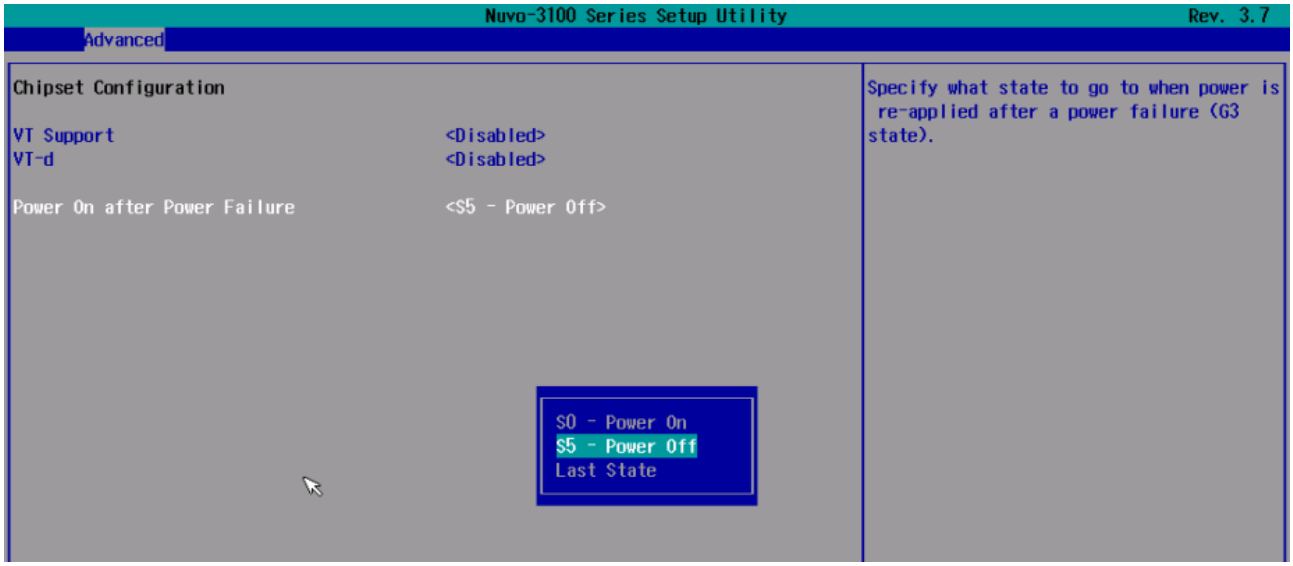
4.1.5 Power On after Power Failure Option

This option defines the behavior of Nuvo-3100 series when DC power is supplied.

Value	Description
S0 – Power On	System is powered on when DC power is supplied.
S5 – Power Off	System is kept in off state when DC power is supplied.
Last State	The on/off state of the system is determined according to the last state when DC power is disconnected. For example, if system is still on but DC power is unplugged, the system is powered on next time when DC power is supplied.

To set "Power On after Power Failure" option:

1. When Nuvo-3100 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[Chipset Configuration]**.
3. Set the **[Power On after Power Failure]** to a proper value for your Nuvo-3100.



Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.1.6 W_DISABLE# for Mini-PCIe Sockets

Nuvo-3100 series feature two mini-PCIe sockets and one mSATA socket for function expansion. According to PCI Express Mini Card Specification Rev. 2.0, two signals, W_DISABLE1# and W_DISABLE2#, are defined to enable/disable radio operation of add-on modules. Nuvo-3100 BIOS provides user-configurable options to control the W_DISABLE# signals for each mini-PCIe/mSATA socket. Please note that most mini-PCIe modules support PCI Express Mini Card Specification Rev. 1.2 only and therefore

To configure W_DISABLE# for each mini-PCIe/mSATA socket:

1. When Nuvo-3100 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[Mini-PCIe Configuration]**.
3. Set the **[W_DISABLE1#]** and **[W_DISABLE2#]** to a proper value according to your application.

Note

1. *As most mini-PCIe modules support PCI Express Mini Card Specification Rev. 1.2 only, we suggest to set **[W_DISABLE1#]** as **[High]** and **[W_DISABLE1#]** as **[Low]** to minimize compatibility issue.*

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.1.7 System Operating Mode

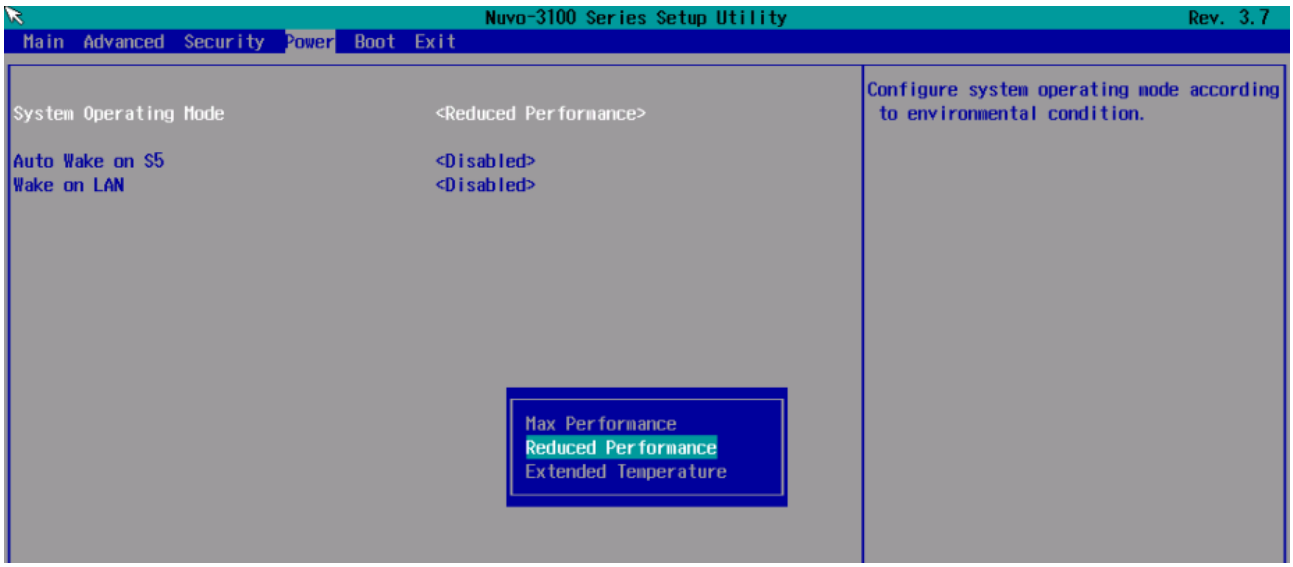
Nuvo-3100 series supports PGA-type CPU to offer greater flexibility for CPU selection. PGA-type processors are with higher CPU power, and therefore introduce higher performance and more heat. For adapting to various environments, Nuvo-3100 series features a unique BIOS option, **System Operating Mode**, to alter CPU power per user's preference. User can select a proper mode according to the environment of deployment (e.g. indoor/outdoor, with/without airflow ant etc.).

	Nuvo-3100 with i7-3610QE (PGA)	Nuvo-3100 with i5-3610ME (PGA)	i7-3517UE (BGA)
Maximal Performance	7407 / 50°C	4388 / 60°C	3449 / 70°C
Reduced Performance	5873 / 60°C	3896 / 70°C	
Extended Temperature	3471 / 70°C	3896 / 70°C	

CPU Benchmark Score v.s. Operating Temperature

To configure system operating mode:

1. When Nuvo-3100 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power]**.
3. Set the **[System Operating Mode]** to a proper mode according to your application.



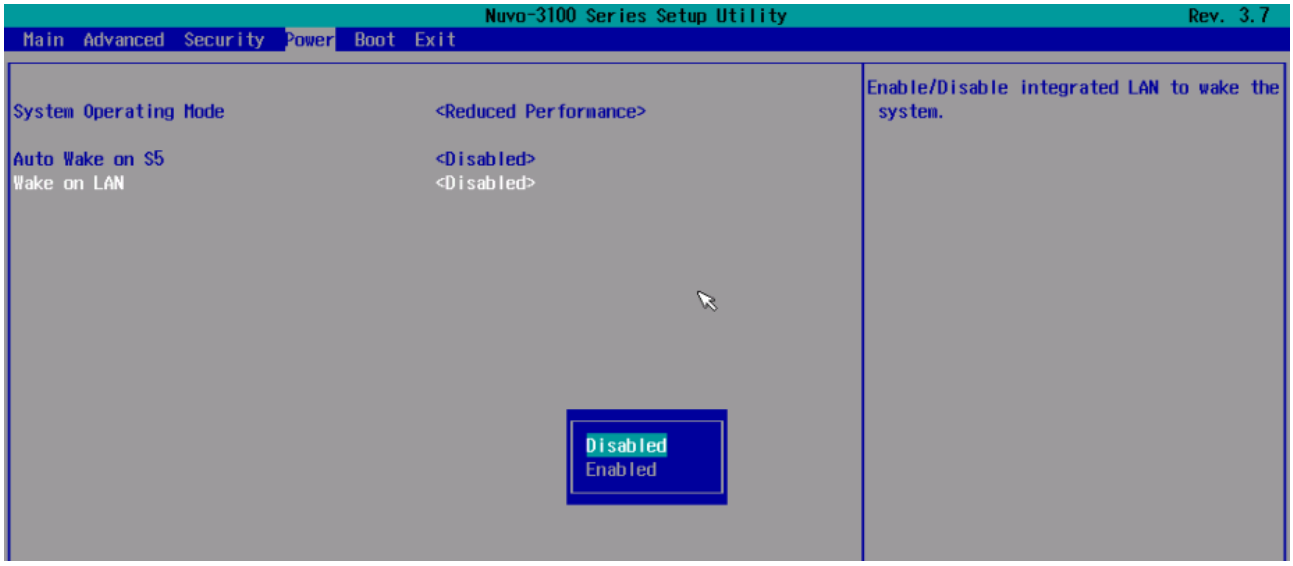
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.1.8 Wake on LAN Option

Wake-on-LAN (WOL) is a mechanism which allows you to turn on your Nuvo-3100 series via Ethernet connection. To utilize Wake-on-LAN function, you have to enable this option first in BIOS settings. Please refer to section 3.6.3 for instructions of using WOL function.

To enable/disable "Wake on LAN" option:

1. When Nuvo-3100 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power]**.
3. Enable/disable the **[Wake on LAN]** option according to your application.



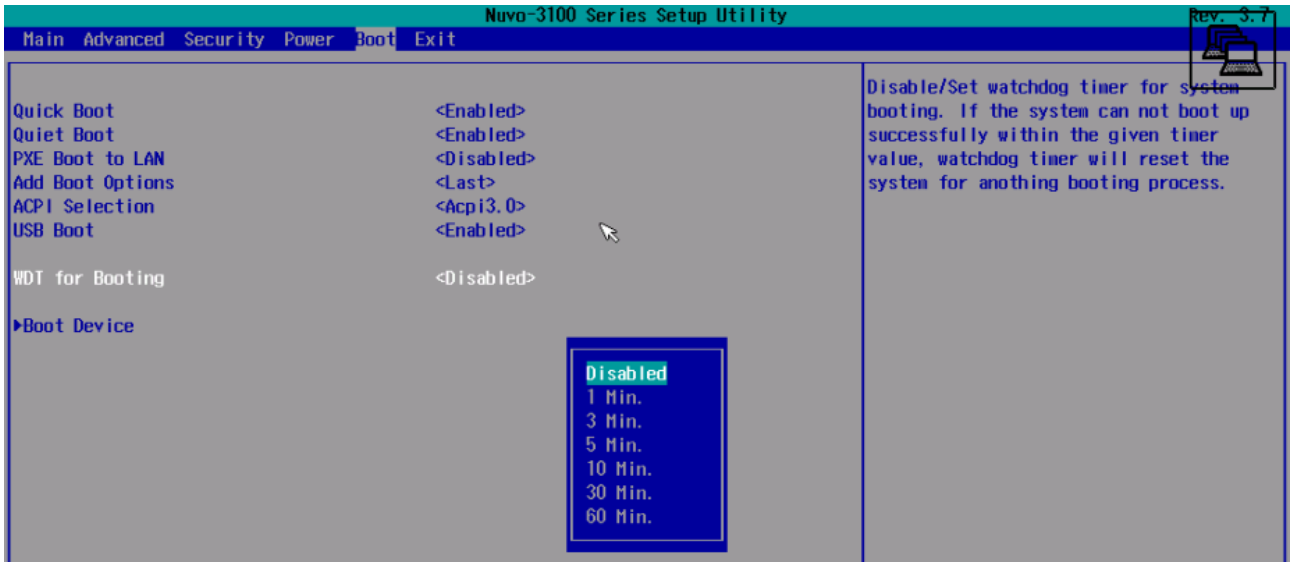
4.1.9 Watchdog Timer for Booting

The BIOS of Nuvo-3100 series has a useful feature which allows users to use the watchdog timer to secure the booting process. You can specify the timeout value for watchdog timer. Once the watchdog timer expires, the BIOS issues a reset command to initiate another booting process. You can also set the behavior of how to stop the watchdog timer. There are two options in BIOS menu, "*Automatically after POST*" and "*Manually after Entering OS*". When "*Automatically after POST*" is selected, the BIOS automatically stop the watchdog timer after POST (Power-On Self Test) OK. When "*Manually after Entering OS*" is selected, it's user's responsibility to stop the watchdog timer when entering OS. This guarantees the system can always boot to OS, otherwise another booting process will be initiated. For information about programming watchdog timer, please refer to **Appendix A Using Watchdog Timer & Isolated DIO**.

To set the watchdog timer for boot in BIOS:

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

1. When Nuvo-3100 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Boot]** menu.
3. Disable or select timeout value for **[WDT for Booting]** option.
4. Once you give a timeout value, the **[WDT Stop Option]** option appears. You can select *"Automatically after POST"* or *"Manually after Entering OS"*.



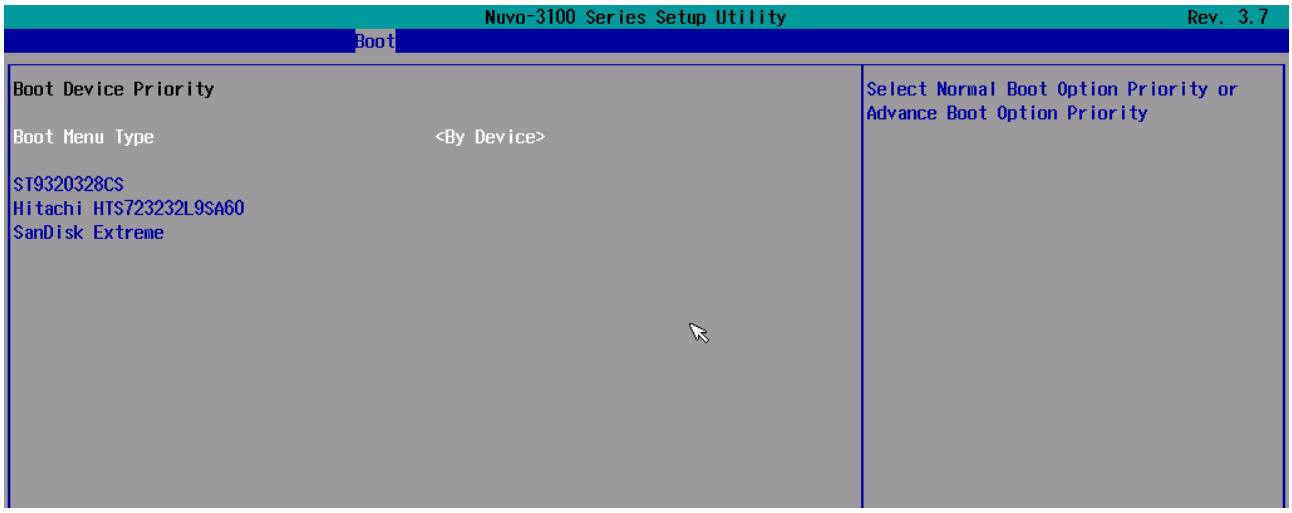
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.1.10 Select a Boot Device

When you have multiple bootable devices connected to your Nuvo-3100 (i.e. HDD, mSATA, USB flash disk, USB DVD-drive), you may need to select one of them as the boot device. There are two ways to select the device. You can either, press F12 when system boots up to go to Boot Manager and then select one of the devices, or select the boot device in BIOS settings.

To select a boot device in BIOS:

1. When Nuvo-3100 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Boot]** → **[Boot Device]**.
3. The **[Boot Menu Type]** option decides whether to list all bootable devices connected to your Nuvo-3100 according to **[By Device]** or **[By Device Type]**. You can use F5/F6 or +/- to change the boot order of devices or device categories.



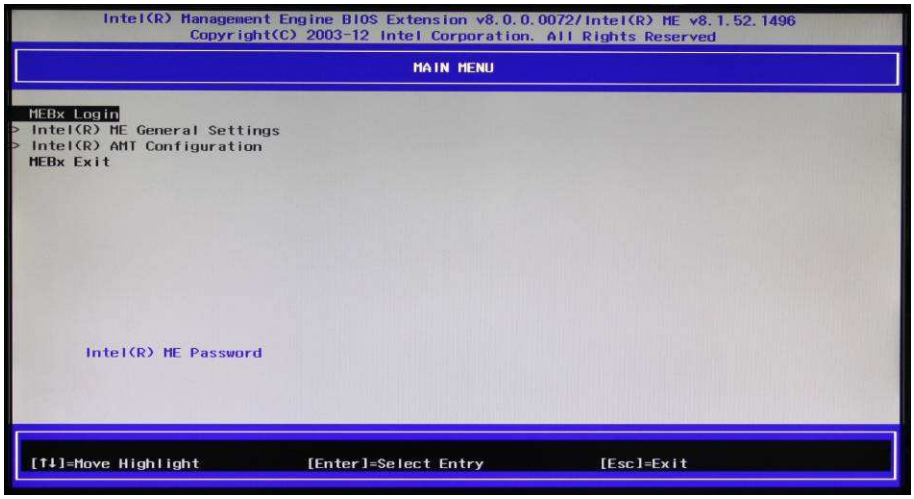
Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.2 Configure AMT (Nuvo-3100VTC Only)

Intel® AMT (Active Management Technology) is a hardware-based technology for remotely managing target PCs via Ethernet connection. Nuvo-3100VTC supports AMT on its first Ethernet port. In prior to use AMT to remotely control Nuvo-3100VTC, you need to configure AMT password and network settings.

1. Make sure you have Ethernet connection on the first Ethernet port of Nuvo-3100VTC.

2. Press F10 when Nuvo-3100VTC boots up. A MEBx configuration page appears.



3. Select "MEBx Login" and you're asked for password. The default password is "admin".
4. For further AMT configuration, please refer to Intel® MEBX User Guide for Intel® 7 Series Chipset. You can find related information at http://www.intel.com/support/motherboards/desktop/sb/CS-033768.htm

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.3 Operating System Support

Nuvo-3100 series supports most operating system developed for Intel® x86 architecture. The following list contains the operating systems which have been tested in Neousys Technology Inc.

1. Microsoft Window XP 32-bit
2. Microsoft Window 7 32-bit
3. Microsoft Window 7 64-bit
4. Microsoft Window 8 32-bit
5. Microsoft Window 8 64-bit
6. Ubuntu (version later than 11.04 Desktop 64bit)*
7. Ubuntu (version later than 10.10 Desktop 32bit)*
8. Debian (version later than 6.0 64bit)*
9. Fedora 14 i386 32bit*
10. CentOS 6.4 32bit

**For Linux system, user may need to manually compile and install the driver for Intel I210 GbE controller if the driver is not embedded in kernel. You can visit Intel website for further information.*

Neousys will keep this list updated as we continuously test other operating systems with Nuvo-3100 series. Please contact us for the latest OS support list.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.4 Driver Installation

Neousys Technology Inc. provides a very convenient utility in "Drivers & Utilities DVD" to allow the "One-Click" driver installation. This utility automatically detects your Windows operating system and installs all necessary drivers to your Nuvo-3100 series with just one mouse click.

4.4.1 Install All Drivers Using "One-Click" Driver Installation

1. Insert the "Drivers & Utilities DVD" into a USB DVD-drive attached to your Nuvo-3100 series. A setup utility launches and the following dialog appears.

2. Click on the **"Automatic Driver Installation"**. The setup utility will automatically detect your Windows operating system and install all necessary drivers. According to different versions of Windows, the installation process takes about 6~8 minutes. Once driver installation is done, the setup utility reboots your Windows and your system works normally afterward.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

4.4.2 Install Drivers Manually

You can also manually install each driver for Nuvo-3100 series. Please refer to the following information about installing drivers for different operating system.

Windows XP SP3

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\XP\infinst_autol.exe)
2. .NET Framework 3.5 (x:\Driver_Pool\DotNET35\XP\dotnetfx35.exe)
3. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7_Vlv\XP\Setup.exe)
4. Audio driver (x:\Driver_Pool\Audio_ALC262\XP\Setup.exe)
5. 82579LM LAN driver (x:\Driver_Pool\GbE_82574L\XP\APPS\PROSETDX\XP2K3_32\DxSetup.exe)
6. I210 LAN driver (x:\Driver_Pool\GbE_I210\XP\I210_XP_Install.exe)
7. ME driver (x:\Driver_Pool\ME_7_Series\ALL\Setup.exe)

Windows XP SP2

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\XP\infinst_autol.exe)
2. Windows Installer 3.1 (x:\Driver_Pool\DotNET35\XP\WindowsInstaller-KB893803-v2-x86.exe)
3. .NET Framework 3.5 (x:\Driver_Pool\DotNET35\XP\dotnetfx35.exe)
4. Audio patch for HD audio (x:\Driver_Pool\Audio_ALC262\XP\MSHDQFE\Win2K_XP\us\kb888111xpsp2.exe)
5. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7_Vlv\XP\Setup.exe)
6. Audio driver (x:\Driver_Pool\Audio_ALC262\XP\Setup.exe)
7. 82579LM LAN driver (x:\Driver_Pool\GbE_82574L\XP\APPS\PROSETDX\XP2K3_32\DxSetup.exe)
8. I210 LAN driver (x:\Driver_Pool\GbE_I210\XP\I210_XP_Install.exe)
9. ME driver (x:\Driver_Pool\ME_7_Series\ALL\Setup.exe)

Windows 7 32-bit

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\Win7_8_ALL\SetupChipset.exe)
2. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7_Vlv\Win7_8_32\Setup.exe)
3. Audio driver (x:\Driver_Pool\Audio_ALC262\Win7_8_ALL\Setup.exe)
4. LAN driver (x:\Driver_Pool\GbE_I210\Win7_8_32\APPS\PROSETDX\Win32\DxSetup.exe)

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

5. USB 3.0 driver (x:\Driver_Pool\USB3_7_Series\Win7_ALL\Setup.exe)
6. ME driver (x:\Driver_Pool\ME_7_Series\Win7_8_AMT\Setup.exe)

Windows 7 64-bit

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\Win7_8_ALL\SetupChipset.exe)
2. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7_Vlv\Win7_8_64\Setup.exe)
3. Audio driver (x:\Driver_Pool\Audio_ALC262\Win7_8_ALL\Setup.exe)
4. LAN driver (x:\Driver_Pool\GbE_I210\Win7_8_64\APPS\PROSETDX\Winx64\DxSetup.exe)
5. USB 3.0 driver (x:\Driver_Pool\USB3_7_Series\Win7_ALL\Setup.exe)
6. ME driver (x:\Driver_Pool\ME_7_Series\Win7_8_AMT\Setup.exe)

Windows 8 32-bit

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\Win7_8_ALL\SetupChipset.exe)
2. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7_Vlv\Win7_8_32\Setup.exe)
3. Audio driver (x:\Driver_Pool\Audio_ALC262\Win7_8_ALL\Setup.exe)
4. LAN driver (x:\Driver_Pool\GbE_I210\Win7_8_32\APPS\PROSETDX\Win32\DxSetup.exe)
5. ME driver (x:\Driver_Pool\ME_7_Series\Win7_8_AMT\Setup.exe)

Windows 8 64-bit

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\Win7_8_ALL\SetupChipset.exe)
2. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7_Vlv\Win7_8_64\Setup.exe)
3. Audio driver (x:\Driver_Pool\Audio_ALC262\Win7_8_ALL\Setup.exe)
4. LAN driver (x:\Driver_Pool\GbE_I210\Win7_8_64\APPS\PROSETDX\Winx64\DxSetup.exe)
5. ME driver (x:\Driver_Pool\ME_7_Series\Win7_8_AMT\Setup.exe)

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Appendix A Using Watchdog Timer & Isolated DIO

Nuvo-3100 series provide a watchdog (WDT) timer function to ensure a more reliable system operation. The WDT is a hardware mechanism to reset the system if the watchdog timer is expired. Users can start the WDT and keeping resetting the timer to make sure the system or program is running. Otherwise, the system shall be reset.
Except for hardware watchdog function, an option of isolated digital I/O is available for extended range of applications. Nuvo-3100 series features 4x isolated DI channels and 4x isolated DO channels via a DSUB-15 connector. The digital I/O supports simple polling mode I/O access so users' program can read or write DIO channel(s) using this function library. Furthermore, it also features an enhanced mode of DI operation called "Change-of-State Interrupt". By detecting any change on digital input channel(s), an interrupt is generated according to a user-defined interrupt mask and level/edge setting, so user's program can react to the change.
In this document, we'll illustrate how to use the function library provided by Neousys to program the WDT and DIO functions. Currently, WDT & DIO driver library supports the following operating systems:

- Windows XP
- Windows 7 (32-bit & 64-bit)
- Windows 8 (32-bit & 64-bit)

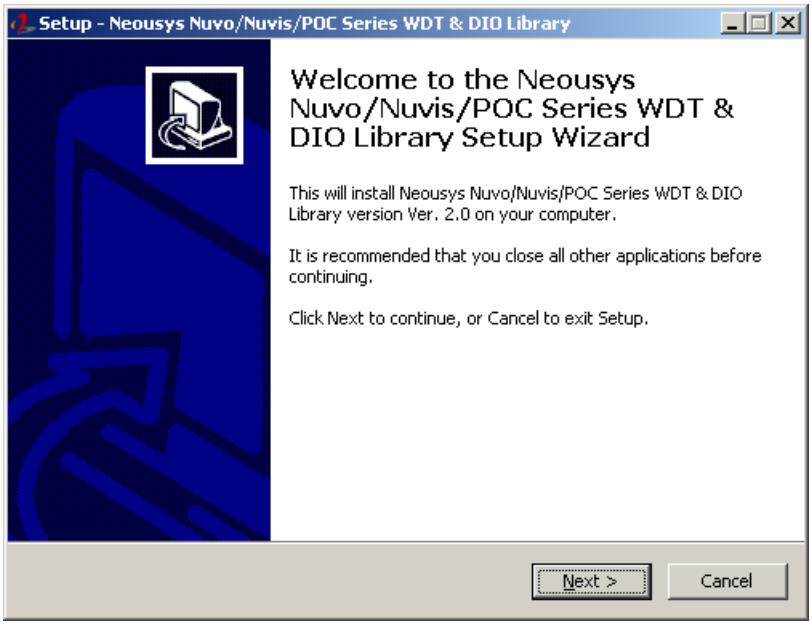
For other OS support, please contact Neousys Technology for further information.

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

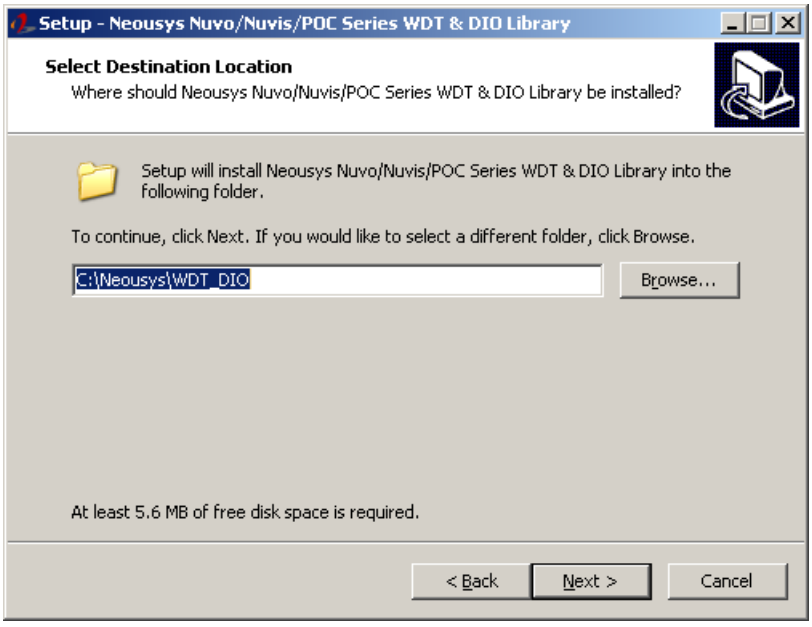
Install WDT and DIO Library

The WDT_DIO function library is delivered in the form of a setup package named **WDT_DIO_Setup.exe**. In prior to program WDT and DIO on Nuvo and POC series, you should execute the setup program and install the WDT and DIO library. Note you need WDT_DIO driver Rev. 2.06 or later to support WDT and DIO functions for Nuvo-3100 series.

1. Execute **WDT_DIO_Setup.exe**. The following dialog appears.

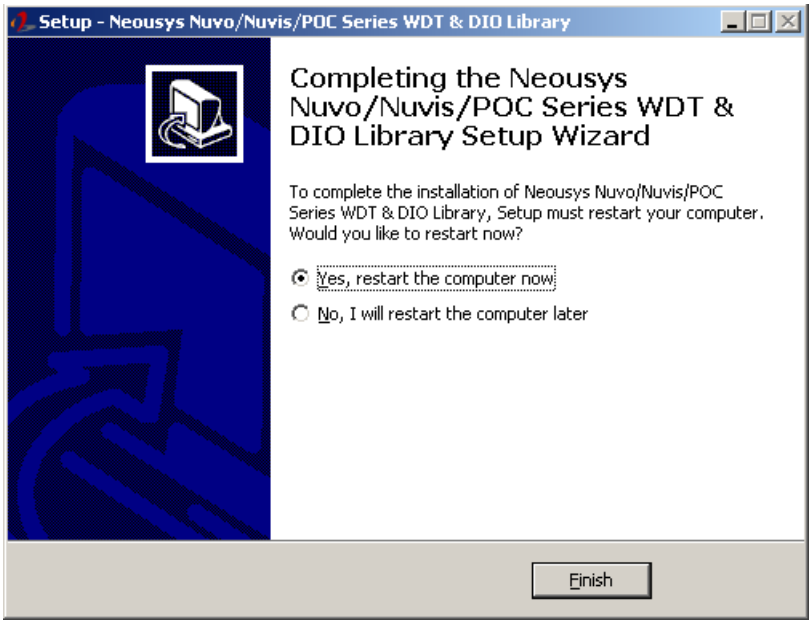

Setup - Neousys Nuvo/Nuvis/POC Series WDT & DIO Library
Welcome to the Neousys Nuvo/Nuvis/POC Series WDT & DIO Library Setup Wizard
This will install Neousys Nuvo/Nuvis/POC Series WDT & DIO Library version Ver. 2.0 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

2. Click "Next >" and specify the directory of installing related files. The default directory is *C:\Neousys\WDT_DIO*.


Setup - Neousys Nuvo/Nuvis/POC Series WDT & DIO Library
Select Destination Location
Where should Neousys Nuvo/Nuvis/POC Series WDT & DIO Library be installed?
Setup will install Neousys Nuvo/Nuvis/POC Series WDT & DIO Library into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Neousys\WDT_DIO
Browse...
At least 5.6 MB of free disk space is required.
< Back
Next >
Cancel

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

3. Once the installation is finished, a dialog appears to prompt you to reboot the system. The WDT & DIO library will take effect after system rebooting.


Setup - Neousys Nuvo/Nuvis/POC Series WDT & DIO Library
Completing the Neousys Nuvo/Nuvis/POC Series WDT & DIO Library Setup Wizard
To complete the installation of Neousys Nuvo/Nuvis/POC Series WDT & DIO Library, Setup must restart your computer. Would you like to restart now?
Yes, restart the computer now
No, I will restart the computer later
Finish

4. When you programming your WDT or DIO program, the related files are located in
   - Header File: \Include
   - Library File: \Lib
   - Function Reference: \Manual
   - Sample Code: \Sample\WDT_Demo (Watchdog Demo)
     \Sample\DIO_Demo (Polling I/O Demo)
     \Sample\COS_Demo (Change-of-State Interrupt Demo)
     \Sample\DTIO_Demo (DTIO Demo)
     \Sample\DTFO_Demo (Trigger Fan-out Demo)
     \Sample\PoE_Demo (PoE per-port Control Demo)

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Using WDT Function

WDT Function Reference

InitWDT

Description

Initialize the WDT function. You should always invoke InitWDT() before set or start watchdog timer.

Parameter

None

Return Value

Returns TRUE if initialization successes, FALSE if initialization failed.

Usage

```
BOOL    bRet = InitWDT()
```

SetWDT

Description

Set timeout value and unit for watchdog timer. When InitWDT() is invoked, a default timeout value of 255 seconds is assigned.

Parameter

tick

WORD value (1 ~ 65535) to indicate timeout ticks.

unit

BYTE value (0 or 1) to indicate unit of timeout ticks.

0 : unit is minute

1: unit is second

Return Value

If value of unit is correct (0 or 1), this function returns TRUE, otherwise FALSE.

Usage

```
WORD    tick=255;
BYTE    unit=1; //unit is second.

BOOL    bRet = SetWDT(tick, unit); //timeout value is 255 seconds
```

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

StartWDT

Description

Start countdown of WDT. When WDT is started, the WDT LED indicator starts to blink in a frequency of 1Hz. If no ResetWDT() or StopWDT is invoked before WDT is counted to 0, the WDT expires and system resets.

Parameter

None

Return Value

If the timeout value is given in correct format, this function returns TRUE, otherwise FALSE.

Usage

```
BOOL    bRet = StartWDT()
```

ResetWDT

Description

Reset the timeout value to the value given by SetWDT(). If no ResetWDT() or StopWDT is invoked before WDT is counted to 0, the WDT expires and system resets.

Parameter

None

Return Value

Always returns TRUE;

Usage

```
BOOL    bRet = ResetWDT()
```

StopWDT

Description

Stop the countdown of WDT. When WDT is stopped, the WDT LED indicator stops blinking.

Parameter

None

Return Value

Always returns TRUE;

Usage

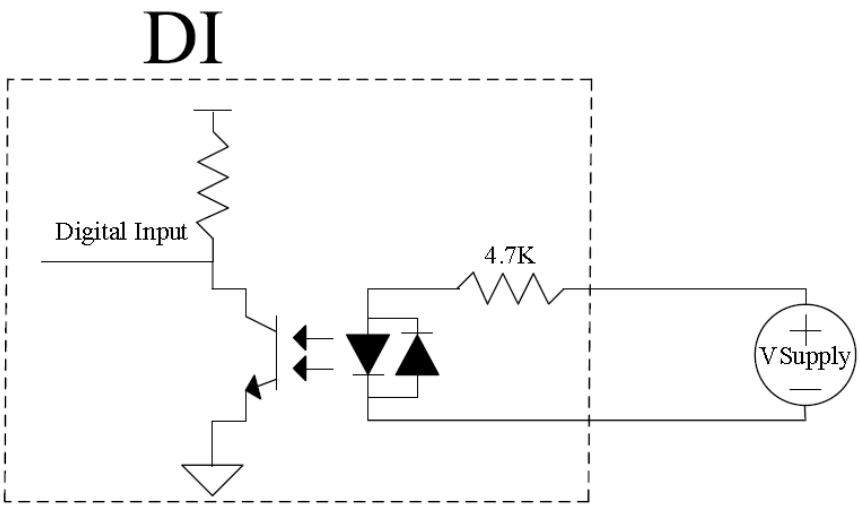
```
BOOL    bRet = StopWDT()
```

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

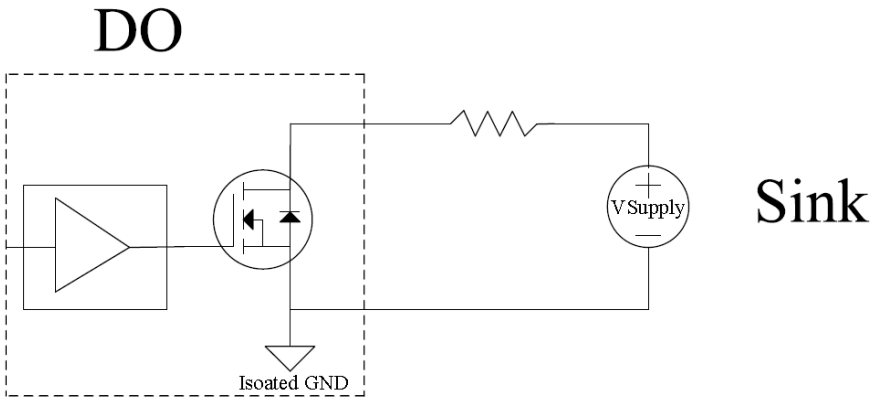
Using DIO Function

Wiring for DIO

The digital input function of Nuvo-3100 series is implemented using a photo-coupler with a internally series-connected 2.4kΩ resistor. You need to provide a voltage to specify the logic high/low state. The input voltage for logic high is 5~24V, and the input voltage for logic low is 0~1.5V.

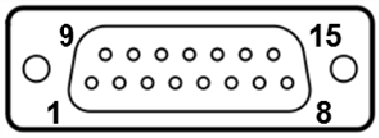


The digital output function of Nuvo-3100 series is implemented using Power MOSFET + Analog Device iCoupler® component. The DO channels are configured as NO (normally-open) configuration. When you turn on system, all DO channels have a deterministic state of logic 0 (circuit disconnected from GND return). When logic 1 is specified, MOSFET is activated and GND return path is established. The digital output function on Nuvo-3100 series supports sinking current connection. The following diagrams are the suggested wiring for DO:



Copyright © 2014 Neousys Technology Inc. All Right Reserved.

DIO Pin Definition



Pin#	Pin Definition	Pin#	Pin Definition
1	DI_0	9	DI_GND
2	DI_1	10	DI_2
3	DI_GND	11	DI_3
4	DO_GND	12	DO_GND
5	DO_0	13	DO_2
6	DO_1	14	DO_3
7	DO_GND	15	ISO_5V
8	VDD		

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

DIO Function Reference

InitDIO

Description

Initialize the DIO function. You should always invoke InitDIO() before write/read any DIO port/channel.

Parameter

None

Return Value

Returns TRUE if initialization successes, FALSE if initialization failed.

Usage

BOOL bRet = InitWDT()

DIReadLine

Description

Read a single channel of isolated digital input.

Parameter

ch

BYTE value specifies the DI channel to be read.

For Nuvo-3100 series, *ch* should be a value of 0 ~ 3.

Return Value

The status (TRUE or FALSE) of the specified DI channel.

Usage

BYTE ch=3; //DI channel #3

BOOL DIChValue = DIReadLine(ch); //read DI channel #3

DIReadPort

Description

Read the entire isolated digital input port (4 channels).

Parameter

None

Return Value

A WORD value indicates the status of DI port (4 DI channels, 0x00 ~ 0x0F).

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Usage

WORD DIPortValue = DIReadPort ();

DOWriteLine

Description

Write a single channel of isolated digital output.

Parameter

ch

BYTE value specifies the DO channel to be written.

For Nuvo-3100 series, *ch* should be a value of 0 ~ 3.

value

BOOL value (TRUE or FALSE) specifies the status of DO channel.

Return Value

None

Usage

```
BYTE    ch=3; //DI channel #3
BOOL    DOChValue=TRUE;

DOWriteLine(ch, DOChValue); //write DO channel #3 as TRUE
```

DOWritePort

Description

Write the entire isolated digital output port (4 channels).

Parameter

value

WORD value specifies the status of the DO port.

For Nuvo-3100 series, *value* should be a value of 0~15.

Return Value

None

Usage

```
WORD   DOPortValue=0x0C; //1100b

DOWritePort(DOPortValue); //write DO port as 1100b
```

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

DOWriteLineChecked

Description

Write a single channel of isolated digital output and read-back the value of DO register. Note that this function is not returned until the DO register is checked and identical to the written value.

Parameter

ch

BYTE value specifies the DO channel to be written.

For Nuvo-3100 series, *ch* should be a value of 0 ~ 3.

value

BOOL value (TRUE or FALSE) specifies the status of DO channel.

Return Value

None

Usage

```
BYTE    ch=3; //DI channel #3
BOOL    DOChValue=TRUE;

DOWriteLineChecked(ch, DOChValue); //write DO channel #3 as TRUE
```

DOWritePortChecked

Description

Write the entire isolated digital output port (8 channels) and check it has been done. Note that this function is not returned until the write value has been checked the same with the device registry.

Parameter

value

WORD value specifies the status of the DO port.

For Nuvo-3100 series, *value* should be a value of 0~15.

Return Value

None

Usage

```
WORD   DOPortValue=0x0C; //1100b

DOWritePortChecked(DOPortValue); //write DO port as 1100b
```

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

Using COS Function

SetupDICOS

Syntax

BOOL SetupDICOS(COS_INT_SETUP *lpSetup, DWORD cbSetup);

Description

Setup Digital-Input(DI) Change-of-State(COS) interrupt parameters.

Parameter

lpSetup [in]

A pointer to a **COS_INT_SETUP** structure that contains the COS configuration information for the DI device.

This data structure contains the following variables:

portMask

WORD value specifies the interrupt mask for corresponding channel(s).

edgeMode

WORD value specifies that interrupt is generated when level change (set to 0) or on rising/falling edge (set to 1) for the corresponding channel(s).

edgeType

WORD value specifies that interrupt is generated on rising edge (set to 0) or falling (set to 1) edge for corresponding channel(s). This value is neglected if *edgeMode* is set to 0 for the corresponding channel(s).

cbSetup [in]

The length of the structure, in bytes. The caller must set this member to sizeof(COS_INT_SETUP).

Return Value

Returns TRUE if setup successes, FALSE if setup failed.

Usage

```
COS_INT_SETUP    setup;

memset(&setup, 0, sizeof(setup));

setup.portMask = 0x0f;    // enable ch.0~3
setup.edgeMode = 0;    // level
setup.edgeType = 0x00;    // Lo/Hi

BOOL    bRet = SetupDICOS(&setup, sizeof(setup));
```

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

RegisterCallbackDICOS

Syntax

BOOL RegisterCallbackDICOS(COS_INT_CALLBACK callback);

Description

Registers a callback function, which is called when the DICOS interrupt occurred.

Parameter

callback [in]

Specifies the callback function. The prototype for this function is descripted as follow.

void __stdcall callback_func(COS_INT_CALLBACK_ARG* arg);

Return Value

Returns TRUE if setup successes, FALSE if setup failed.

Usage

```
void __stdcall callback_func(COS_INT_CALLBACK_ARG* arg)
{
    printf("data=0x%02x, flag=0x%02x, seq=%02d\n",
    arg->portData, arg->intrFlag, arg->intrSeq);
}
BOOL    bRet = RegisterCallbackDICOS(callback_func);
```

StartDICOS

Syntax

BOOL StartDICOS(void);

Description

Start DI Change-of-State interrupt

Parameter

None

Return Value

Returns TRUE if start procedure successes, FALSE if start procedure failed.

Usage

```
BOOL    bRet = StartDICOS();
```

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

StopDICOS

Syntax

BOOL StopDICOS(void);

Description

Stop DI Change-of-State interrupt

Parameter

None

Return Value

Returns TRUE if stop procedure successes, FALSE if stop procedure failed.

Usage

BOOL bRet = StopDICOS();

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

DI COS Example

```
#include <stdio.h>
#include <stdlib.h>
#include <windows.h>
#include "WDT_DIO.h"

//Step 0, define a Change-of-State Interrupt callback function
void __stdcall callback_function(COS_INT_CALLBACK_ARG* arg)
{
	printf("data=0x%02x, flag=0x%02x, seq=%02d\n",
	arg->portData, arg->intrFlag, arg->intrSeq);
}

int main(int argc, char* argv[])
{
	//Step 1, initialize DIO library by invoking InitDIO()
	if ( ! InitDIO() )
	{
		printf("InitDIO --> FAILED\n");
		return -1;
	}
	printf("InitDIO --> PASSED\n");

	//Step 2, setup Change-of-State Interrupt mask and level/edge mode
	COS_INT_SETUP	setup;

	memset(&setup, 0, sizeof(setup));

	setup.portMask = 0x0f;	// 00001111b, enable ch.0~3
	setup.edgeMode = 0x00;	// generate interrupt on level change
	setup.edgeType = 0x00;	// rising/falling edge, only effective when edgeMode = 1

	if ( ! SetupDICOS(&setup, sizeof(setup)) )
	{
		printf("SetupDICOS --> FAILED\n");
		return -2;
	}
	printf("SetupDICOS --> PASSED\n");
```

Copyright © 2014 Neousys Technology Inc. All Right Reserved.

```
    //Step 3, register the callback function
    if ( ! RegisterCallbackDICOS(callback_function) )
    {
        printf("RegisterCallbackDICOS --> FAILED\n");
        return -3;
    }
    printf("RegisterCallbackDICOS --> PASSED\n");

    //Step 4, start the DI Change-of-State Interrupt
    if ( ! StartDICOS() )
    {
        printf("StartDICOS --> FAILED\n");
        return -4;
    }
    printf("StartDICOS --> PASSED\n");

    printf("\npress any key to stop...\n");
    system("pause >nul");

    //Step 5, stop the DI Change-of-State Interrupt operation
    if ( ! StopDICOS() )
    {
        printf("StopDICOS --> FAILED\n");
        return -5;
    }
    printf("StopDICOS --> PASSED\n");

    printf("\npress any key to exit...\n");
    system("pause >nul");
    return 0;
}
```

Copyright © 2014 Neousys Technology Inc. All Right Reserved.